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COMPUTERWORLD

INSIDE

Five-model 'E' series powers Amdahl retort

BY JEFFRY BEELER
CW STAFF

SUNNYVALE, Calif. — Amdahl Corp. last week countered IBM's latest 3090 mainframe family enhancements with the introduction of a three-way processor that reportedly delivers approximately 8% higher price/performance than its Big Blue counterpart.

The company also replaced its four existing Series 5890 mainframes with enhanced 3090-class alternatives that cost the same as their predecessors but offer 4% to 13% more throughput. With the announcement, Amdahl renamed all four of the previous 5890s — the 5890-190, 5890-200, 5890-300 and 5890-600 — by adding the designation "E" at the end of each enhanced model number, just as IBM did [CW, Feb. 2].

The three-processor 5890-400E and the rest of what the vendor called the E-series models reportedly owe their increased performance to random-access memory chip and logic refinements that can be retrofitted to Amdahl 5890s already in use.

Customers who want to upgrade installed 5890s to the E-series equivalents can do so by swapping boards, according to Dennis Stein, Amdahl's manager of processor systems marketing.

The field upgradability of Am-

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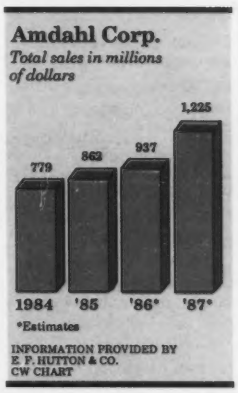

Apollo disperses power

Net scheme offers distributed applications processing

BY ROSEMARY HAMILTON
CW STAFF

CHELMSFORD, Mass. — Apollo Computer, Inc. laid the groundwork last week for an ambitious network computing strategy that could radically change the way engineers and software developers process applications.

The Network Computing System is intended to provide users with the ability to split applications into portions that would be farmed out to various computing resources on a heterogeneous network for simultaneous computation. While other vendors have provided tools to share files or access data among heterogeneous systems, there are no commercially available products comparable to the Apollo system, according to analysts.

However, Apollo's system will not be available until the third quarter. Company officials said that some of the tools are at a few user sites but declined to name them. One vendor, Alliant Computer Systems Corp., announced its support of NCS last week. Apollo currently resells Alliant's minisupercomputers as Apollo Domain network compute servers, which process large jobs that smaller workstations cannot handle.

The Space and Technology Division of TRW, Inc. has been approached by Apollo to act as a beta site, but it has not yet made a decision, according to Thomas Heim, manager of engineering computation at the division. "We're thinking about it, and if they can do it, then they have a hell of a leg up on everyone else," Heim said. "It sounds like a significant milestone."

According to Edward Zander, Apollo's vice-president of marketing, the company plans to proceed slowly with the new technology. "We have some

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Reluctant support for Netview PC

BY ELISABETH HORWITT
CW STAFF

WASHINGTON, D.C. — The same vendors and users that are publicly supporting IBM's Netview PC scheme privately harbor grave misgivings about the consequences of adopting it as a network management standard.

About 15 vendors are currently writing hooks to Netview PC, which will enable their network diagnostic and monitoring systems to feed data to IBM's Netview family of host-based network management systems.

But at the Communication Networks Conference and Exposition last week, vendors, users and analysts pointed out gaps in the Netview umbrella, particularly in the data manipulation and presentation areas. In addition, several exhibitors said they were unwilling or unable to integrate their proprietary network statistics analysis and reporting systems with IBM programs that are currently designed to manage only IBM/Rolm Corp. network equipment.

One attendee, a communications manager from a major investment company that is currently evaluating network and network management systems, complained that Netview PC "gathers information from different vendors' systems but lacks an application to put that data into usable form." Since each vendor already has a different application for doing this, "How am I going to get a common syntax so I can use it?" the manager asked.

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Criminal past of IEEE officer went undisclosed

Few members knew of computer-aided heist

BY JEFFRY BEELER
CW STAFF

WASHINGTON, D.C. — When Stan Rifkin announced his candidacy last spring for local office in the Institute of Electrical and Electronics Engineers, leaders of the association's section here published a professional biography.

But what the local leadership of the world's largest professional society neglected to tell most of its members — less than 1% of whom attended the subsequent election meeting — is that Stanley Mark Rifkin is a convicted felon who, in 1978, masterminded one of the most sensational computer crimes ever. In 1982, he ended a three-year sentence at California's Terminal Island Prison for electronically diverting $10.2 million from Los Angeles-based Security Pacific National Bank to his personal account at a New York bank.


Rifkin in 1978

The omission of Rifkin's criminal history did not result from ignorance among the local IEEE officers who authorized his run for a directorship in the association's Washington, D.C., section. On the contrary, "his past was well known both to me and to most members of the section's Ex-

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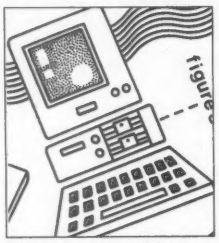
IN THIS ISSUE

SQL Mania. The widespread acceptance of relational technology fuels industry's fire as corporations rush to standardize SQL all the way down to PCs and vendors publish a 'least common denominator' standard that has some users burning up. **Pages 23,31,101**

Breaking away from large scale. Downsized version of Cray X-MP series aims to attract Fortune 500 commercial enterprises with lower entry price into supercomputing; Teradata's LAN tie-in skirts previously required mainframe pass through. **Pages 8,12**



Diplomacy in writing: *People write documents, and where there are people, there are politics. By Paula Bell. Page 63.*

The Solution unravels at Hartford Insurance

BY DAVID A. LUDLUM
CW STAFF

HARTFORD, Conn. — The Hartford Insurance Group has withdrawn from the market its programmer productivity software, The Solution, and all but closed Hartford Integrated Technologies, Inc. (Hitech), the subsidiary it set up 19 months ago to market the product.

Almost a year to the day after announcing licensing agreements with third-party vendors and a joint marketing agreement with Wang Laboratories, Inc. — the maker of the hardware that Hitech's product runs on — Hitech is dissolving these pacts.

Wang, which hoped The Solution would bolster its effort to become a major supplier of data processing equipment, is evaluating whether it will continue to market the software, a Wang spokesman said.

Thus far, The Solution, which The Hartford Insurance Group developed in-house for automating its software development and maintenance, has been acquired only in limited test versions, according to the Wang spokesman, Edward Clough.

The sales involve "smaller versions in-house to basically kick the tires," said Clough, who declined to disclose how many companies are testing the product.

In announcing The Solution a year ago, The Hartford and Wang said they were targeting a modest goal of 10 full-blown installations for 1986.

The Solution has failed to sell primarily because potential customers are not willing to provide the support the system requires in areas such as training and development of methodologies, according to John T. Crawford, director of information management for the Hartford and former president of Hitech.

"We didn't find many ready to make that kind of commitment," Crawford said. "We have mutually come to the conclusion that we couldn't afford to continue this in the full-scale basis, primarily because the market wasn't ready to do what we wanted it to do."

Clough said Wang anticipated that The Solution would have a long selling cycle because the concept behind it must be sold before the product.

He estimated the cost of The Solution in a model configuration for 40 software professionals to be $27,000 per user, or $1.08 million. The software runs on Wang VS hub computers and Wang Professional Computer workstations.

The Hartford will try to keep Hitech running as a shell, with one executive, and to sell pieces of The Solution, Crawford said. The first piece will be Scoreboard, which is for quality control in Cobol development and maintenance.

The company formed Hitech in July 1985 to sell The Solution. At its peak in the middle of last year, the subsidiary employed 26 people, Crawford said. He confirmed that it lost money but declined to say how much.

IBM silent on Fujitsu case

BY ALAN ALPER
CW STAFF

NEW YORK — IBM last week declined to discuss a report that it has reached a partial settlement of a dispute with Fujitsu Ltd. in Tokyo that involved the Japanese company's alleged continued infringement of a mainframe operating system.

According to a report in a Japanese newspaper, Fujitsu has agreed to pay IBM $65 million a year to use its version of the MVS/XA operating system.

An IBM spokesman declined comment on the matter.

Sources knowledgeable of the situation said the $65 million annual payment made sense in light of Fujitsu's current mainframe sales. They questioned, however, why IBM did not press for back damages. "Perhaps [IBM] did not want to ask for too much and put Fujitsu out of business," a source in the plug-compatible mainframe business said. "It would have looked too hostile if they had put the company into bankruptcy."

The two companies have been engaged in a year-long battle before the American Arbitration Association regarding charges that Fujitsu violated a 1983 agreement under which it was supposed to pay IBM an unspecified sum and allow periodic inspection of its systems software. IBM charged that Fujitsu copied IBM's MVS/XA operating system in creating an operating system for its own line of plug-compatible mainframes.

Under terms of its 1983 settlement, Hitachi was to pay IBM on a sliding scale, sources said. The initial figure was reportedly $400 million, sources said last week. Certain requirements were eased by IBM late last year.

Fujitsu could not be reached for comment by press time.

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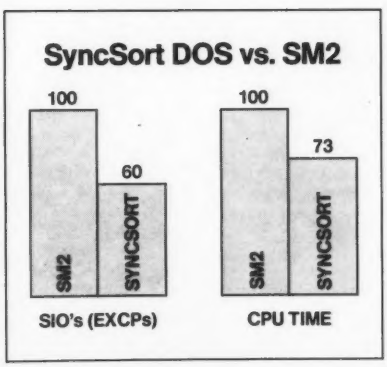

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Users skeptical about ISDN benefits, support

BY DONNA RAIMONDI
CW STAFF

WASHINGTON, D.C. — Despite the rush by telecommunications suppliers to develop integrated services digital network (ISDN) products and services, users remain skeptical about immediate benefits of the technology and the likelihood of adequate service support.

Potential ISDN users who were interviewed at the Communication Networks Conference and Exposition (Comnet) last week pointed to the 1990s as a likely time frame for widely available services.

ISDN promises simultaneous high-speed data and voice transmission, interactive voice mail, call management and messaging and switched-host access. While it enhances or replaces Centrex services and adds value to the plain facilities telephone companies offer, only the pioneer customers are likely to fare well in implementing such services, observers said.

The second tier of users will get stuck with problems because they will get less attention from the vendors, according to T. Doane Perry, senior telecommunications consultant at International Data Corp. (IDC).

'Little recourse'

"If the customer is not in the limelight, there is little recourse for solving problems," said Michael J. Vonder Heide, voice network manager at Ace Hardware Corp. in Oak Brook, Ill. Ace, a cooperative of 5,000 hardware stores and 13 distribution centers, is in the process of cutting over to AT&T's 5ESS ISDN-compatible digital switch.

Ace is in the early stages of planning for ISDN. "We're watching the McDonald's Corp. [fast-food restaurants] trial carefully. We want to be on the cutting edge, but we will wait and see because its still in its infancy," Vonder Heide said.

"ISDN is coming because the vendors need it to sell equipment with," IDC's Perry told about 200 attendees at an ISDN session Tuesday morning.

While he said he does not expect to see ISDN become fully available until the 1990s, Joseph Monks, a manager of marketing at General Electric Co. in Bridgeport, Conn., said ISDN service will become vital. "The best part of it is that we will have one common access point to the network that gives all the services we need," he said.

'Pricing vague'

But vendors will not sell the ISDN services to customers until they can show a cost/benefit relationship. "The pricing is very vague now," Monk said.

This thought was echoed by Richard Kuehn, president of RAK Associations in Cleveland, who spoke at the ISDN session. "I worry that it will wind up like Videotex. Everybody loved it but wouldn't pay for it," he commented.

Loren Henry, director of ISDN planning at regional holding company U.S. West, a firm that is holding several ISDN trials, intimated that cost savings would accrue to customers because there are several pieces of equipment they would not need to buy, such as cluster controllers, integrated voice/digital hardware, analog-to-digital networks and modems.

Netview PC

FROM PAGE 1

Users are interested in Netview and Netview PC's potential for providing a centralized multivendor network management system with a consistent user interface but "aren't rushing into things," according to Thomas McDonald, a partner at consulting and software company MGT Technology Group. "Applications have to be written before Netview PC is usable, and most users feel that while they'll need a central management facility someday, it isn't critical today," McDonald said.

Sometime in the second half of this year, when Netview PC becomes commercially available, IBM will offer network management applications that will accept data through the Netview PC interface — but only data that is generated by IBM and IBM/Rolm products, IBM senior marketing support representative David Thoenen said.

The vendor has announced general-purpose service routines that use Netview PC as an interface between other vendors' network management systems and collection areas in the IBM host. One such program is a VTAM-based interface that enables Netview PC to send alarm data to a Netview program. A second program transfers batches of network statistics, such as call-detail records, from Netview PC to an IBM CICS-based file-catcher program residing on the host, according to Thoenen.

A number of vendors are developing programs that will allow their systems to send alarm statistics to Netview PC and on to the Netview program for alarm collection and filtering. But while IBM/Rolm offers a CICS-based program to collect call-detail record statistics from a Rolm CBX private branch exchange, there is no CICS application for analyzing statistics from other vendors' systems, according to McDonald.

"Everyone agrees on what kinds of network alarms you need, but there are far more possibilities with usage accounting or traffic analysis — so they are far harder to standardize," McDonald pointed out.

And IBM is leaving it up to users and vendors to resolve this issue. "We don't know whether vendors will write CICS programs from scratch or write the code to merge their products with ours," Thoenen said.

IBM sponsorship

IBM's sponsorship of a Netview-based industry standard could hinder rather than help its acceptance, the investment firm manager suggested at Comnet.

"Every vendor I've talked to is loathe to give over control of its networking products to IBM. This is a great opportunity [to come up with a standard] for a third-party vendor that people aren't afraid of," the manager said.

Several network equipment vendors said they are unwilling to make their own network management systems subordinate to IBM's, claiming that their own systems offer features that Netview lacks.

"We think IBM's network management system should feed data to our system — not vice versa — because we have the strong operator interface, but we're not sure the Netview PC hooks work both ways," said Case Communications, Inc. Senior Director of Product Marketing Art Alberding. Case is one of several vendors evaluating the IEEE 802.3 networking protocols as a way for network products to pass management data across networks, he said.

IBM's Thoenen admitted that Netview's operator interface lacks graphics, adding that up until recently at least, IBM has "concentrated on quality in its network management products. . . . Now it's time to concentrate on presentation."

Despite their criticisms of the protocol, a number of vendors at Comnet have announced intentions to support Netview PC.

Netview PC's only apparent rival in the standards sweepstakes is a set of network management administration protocols that AT&T is working on with "several other companies — principally customer-premise equipment makers," according to Richard Snowden, director of AT&T's Concepts Development Center.

FCC under fire from carriers

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — AT&T, MCI Communications Corp. and U.S. Sprint Communications Co., all hit by recent financial losses and layoffs, last week blasted the U.S. Department of Justice proposal to allow the regional Bell holding companies to offer limited long-distance service.

The remarks, made here at the Communication Networks Conference and Exposition, suggested that the three major long-distance companies are worried the financially healthy Bell spinoffs will capture significant amounts of long-distance business. The International Communications Association, a major business users group, has warned that the Bell holding companies could eventually put MCI and U.S. Sprint out of business [CW, Feb. 9].

In the most strident criticism, MCI President Bert C. Roberts Jr. said the department "completely ignores the fact that allowing the [divested] Bell operating companies to offer any long-distance service puts them, once again, in direct competition with companies such as MCI."

Roberts said the department wrongly views the three long-distance companies as healthy giants. He said they have been battered by multimillion-dollar financial losses and employee layoffs, while the regional Bell holding companies each had profits of about $1 billion last year and have gone on a buying spree.

Unsympathetic officials

Officials from the Justice Department and the Federal Communications Commission were not sympathetic. Charles F. Rule, acting head of the Justice Department's antitrust division, said he recognizes that the Bell companies could put more pressure on the profit margins of MCI and U.S. Sprint but said the department's mission is to "protect competition, not competitors."

Likewise, Albert Halprin, chief of the FCC's common carrier bureau, said it is impossible for MCI and U.S. Sprint to turn a profit so soon after building their expensive nationwide networks, just as it is impossible for a hotel owner to make a profit in the first two years after a new hotel is built.

But MCI President Roberts charged that the Justice Department proposal abandons the

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Token-Ring keys missing

BY PATRICIA KEEFE
CW STAFF

WASHINGTON, D.C. — Users attending last week's Communication Networks Conference and Exposition (Comnet) here indicated they are more than willing to wait for IBM to release the various pieces of its Token-Ring network but that for planning purposes, they want to know exactly what it is they are waiting for.

Yet many reported they did not get the information they were hoping to find.

"I'm not sure if we can wait for IBM to answer our questions about the Token-Ring," said Craig Cushman, a telecommunications analyst for Steelcase, Inc. in Grand Rapids, Mich. Steelcase is researching network technologies, including Systems Network Architecture, Manufacturing Automation Protocol (MAP) and IBM's Token-Ring. "We've set up MAP pilots on a limited basis," he said.

Not getting answers

Cushman, who described himself as a data communications manager, said he was not getting the answers he needed from IBM. "You can decide on the technology when looking at the theory to see if it makes sense," he commented. "But that doesn't mean you want to throw out all you know and install something you know little about."

"If we wait for IBM, we'll be left waiting at the train station," complained an attendee from GTE Corp. at a session covering IBM's Token-Ring and AT&T's Starlan. The GTE executive was very critical of the speed with which IBM has been delivering the pieces of its Token-Ring and its responsiveness to GTE's inquiries on the subject. He also complained about the inability to link the IBM System/36 to the Token-Ring today.

"We all have that frustration," said Thomas M. Hadley, a consulting support representative with IBM in Research Triangle Park, N.C., responding to complaints that IBM is just not moving fast enough with its network plans. "But it takes time to develop hardware and software, and we're really trying."

"We can only produce so many lines of code a day," added David Leo, a Telecommunications Marketing Center consulting marketing support representative with IBM's Information Systems Group in Research Triangle Park. One user noted GTE is on the "bleeding edge" of technology. Under pressure from its own customers to install the Token-Ring, GTE is naturally eager for IBM to reveal and release the missing pieces of its communications strategy, he said.

Not everyone is quite so concerned with the pace of IBM's Token-Ring announcement, however.

"Look, people don't expect IBM to be leading-edge. Maybe IBM is a little behind, but eventually they'll get their act together, and it will work," said Thomas McDonald, a consultant with the Waltham, Mass.-based MGT Technology Group.

"Every one of my large [Fortune 1,000] IBM users is asking me about Token-Ring, but they don't understand what it's for or where it fits," McDonald commented.

Many companies are still evaluating networks because up until very recently, network use has been driven by end users sneaking departmental networks past MIS. Steelcase is one example in which personal computer networks have been installed through user departments, but that is changing, Cushman said.

FCC under fire

CONTINUED FROM PAGE 4

business restrictions that were considered essential to the AT&T divestiture accord and opens the door to "the same kinds of anticompetitive abuses that were so common during the Bell system years." He urged the U.S. Congress to investigate the proposal.

The Justice Department on Feb. 2 urged U.S. District Court Judge Harold H. Greene, who administers the AT&T divestiture decree, to remove the ban on Bell company participation in information processing services and equipment manufacturing and to allow them to offer long-distance services outside their regions.

The department argued that the divested Bell operating companies should not be allowed to offer long-distance service that originates or terminates inside their territories, because there they have monopoly power over access to the local exchange.

AT&T President Robert E. Allen said he was puzzled by the Justice Department's deregulation proposal because the local exchange monopoly identified in the 1982 divestiture decree still exists.

"If there was merit to the concern about mixing local monopoly service with long-distance competitive services or to the concern about a monopoly provider also manufacturing its own equipment . . . they still have merit," Allen said. "On the other hand, if these were trivial concerns, a very cruel joke has been played on the nation."

John R. Hoffman, senior vice-president for regulatory and legal affairs at U.S. Sprint in Kansas City, Mo., warned, "If you let the regional Bell holding companies in [long distance] now, you would destroy competition, not enhance it."

DEC adds low-cost entry to VAX

Ties systems in clusters but withholds Q-bus expansion

BY NINAMARY BUBA MAGINNIS
CW STAFF

BOSTON — Digital Equipment Corp. is aggressively positioning itself in the workstation market, in which it enjoyed considerable success last year, with its low-cost Vaxstation 2000 and Microvax 2000, according to industry watchers and DEC competitors.

The machines were unveiled last week along with provisions for tying DEC's smallest VAXs together in clusters.

The single-user Vaxstation 2000 and multiuser Microvax 2000 are based on the 0.9 million instructions per second Microvax II chip. An optional expansion box can add up to 166M bytes of external storage. "The black-and-white Vaxstation II is replaced by this [Vaxstation 2000], except if you need expansion capabilities provided by the Q-bus," said Jeffrey C. Kalb, DEC's vice-president for low-end systems and technologies. DEC will announce its 2000-series color version within months, he added.

Entry, not replacement

However, DEC gravely limited the expansion capabilities of the new systems by not including a Q-bus backplane. Officials said the 2000 series is intended to be an inexpensive way to get into the VAX architecture, not a replacement for existing machines.

"They're trying to leverage the fact that this is low-end, and you've got all this VAX architecture behind you if you need to grow," agreed John McCarthy, research manager at Cambridge, Mass.-based Forrester Research, Inc.

Although the 2000-series systems can run as stand-alones, they are designed for local-area Vaxclusters, a technology announced last November.

To assist customers in installing low-end Vaxclusters, DEC includes a one-year, on-site warranty in the purchase price, according to DEC's Kalb.

Low-end Vaxclusters use a Microvax II or larger VAX machine as a central controlling boot node and can link up to 13 Vaxstation 2000, Microvax 2000, Vaxstation II, Vaxstation II/GPX or Microvax II machines. "It all looks and acts as one big system. Everyone works from the same data," noted Neil Baldridge, vice-president of Compushare, a Lubbock, Texas-based beta-test user and DEC value-added reseller.

"If you need more than 140M bytes of disk space, the logical move is to go into a cluster environment," Baldridge said. Peripherals installed on the boot node are accessed by all cluster users, he said.

'Not the way people work'

Low-end clustering is DEC's answer to off-loading processing power when the Microvax II becomes overtaxed, according to Forrester Research's McCarthy. Other workstation vendors include Microsoft Corp. MS-DOS operating system functionality for users who want to run such business applications as Lotus Development Corp.'s 1-2-3, he said. With DEC, "if you want personal computer functionality, you've got to have a Vaxmate and Vaxstation on your desk, and that's not the way people work," McCarthy said.

DEC officials claimed their low-end workstation is not pitted against other workstation vendors such as Chelsmford, Mass.-based Apollo Computer, Inc. and Mountain View, Calif.-based Sun Microsystems, Inc. But Edward J. Zander, Apollo's vice-president of marketing, said, "DEC has been chasing us for the last four years trying to get into this market."

DEC's 2000-series workstations, which share the VAX architecture and DEC's VMS operating system and Ethernet networking scheme, will head off the migration of DEC users who are opting for Sun equipment, predicted Sonny Monosson, publisher of "Monosson on DEC."

Because the Vaxstation 2000 also runs Ultrix, a Unix operating system based on the University of California at Berkeley Unix 4.2, the workstation can run as an open system using Sun's Network File System gateway. Sun's converged Unix operating system includes Versions 4.2, 4.3 and System V, said John A. Hime, Sun's marketing director. "If you start talking to the U.S. government and large corporations, the strong message is to operate System V," he said.

Frustrates programmers

The Microvax 2000 works well as a computer server but does not allow programmers to work on driver development because the system lacks a Q-bus, according to beta-test user Wendy Koenig, systems development manager for the Burlington, Mass.-based Ziff-Davis Technical Information Co. If the boot node fails, the entire system is inaccessible, Koenig said. While boot-node failure can hamper operations, it has not caused problems at Ziff-Davis, Koenig said.

Edward D. Jones & Co., a St. Louis-based brokerage firm, has been evaluating the Microvax 2000 since September, according to Rich Malone, general partner responsible for data processing. The firm operates an IBM 3090 Model 200 and a 3083 and said it plans to replace its dumb Unisys Corp. terminals, located at 1,100 branch offices across the country, with intelligent systems. After evaluating both DEC and the IBM Personal Computer line, Jones ranked the Microvax 2000 as superior, Malone said.

Although no orders have been placed yet, each branch office will probably run a Microvax 2000 with two terminals and a printer, Malone reported.

DEC low end

New 2000 models

	Diskless monochrome Vaxstation 2000	*Disk-based monochrome Vaxstation 2000*	*Fully configured disk-based monochrome Vaxstation 2000*	*Entry-level Microvax 2000*	*Diskless Microvax 2000*	*Fully configured Microvax 2000*
Users	1	1	1	1-4	1-4	1-4
Memory (bytes)	4M or 6M	4M or 6M	6M	4M or 6M	6M	4M or 6M
Expanded Storage (bytes)	—	42M disk drive 1.2M floppy drive	71M disk drive 95M streaming tape drive	42M disk drive 1.2M floppy drive	—	71M disk drive 95M streaming tape drive
Price	$10,500	$13,150	$22,245	$11,100	$12,900	$18,195
Price with additional memory	$12,500	$15,150	—	$13,100	—	$20,195

CW CHART

Apollo

FROM PAGE 1

tools, and that's a start. We have a ways to go here, but we've hit a nerve with our customers. So we'll take it real easy. We're still shaking it out and learning about it," Zander commented.

The NCS, designed for a heterogeneous environment, will be initially available for Apollo systems, other Unix-based systems and Digital Equipment Corp. VMS-based systems, according to the vendor. Apollo will also provide source code for other vendors to create the necessary software and compiler to run NCS in their environment. It can support common industry standard networking protocols, including the Transmission Control Protocol/Internet Protocol and IBM's Systems Network Architecture, Apollo said.

With the intent of promoting NCS as an industry standard, the vendor will make public the specifications for its Network Computing Architecture, on which NCS is based.

The new system is targeted at both software developers and large user sites, where in-house programs are used along with off-the-shelf applications. Users will also be able to port existing applications to the NCS environment if those programs are based on a structured language such as C, Apollo spokesmen said.

> WITH the Apollo system, users can optimize the computing resources on a network — a key productivity issue at large engineering installations.

If vendors and users support the Apollo system, users will eventually be able to write and buy software that can take advantage of the shared-computing environment. This would enable users to optimize the various computing resources on a network, a key productivity issue at large engineering installations, industry analysts said.

A user at a workstation could bring up an application, and subroutines of that application could be remotely processed at a number of nodes. Without NCS, a user would run the entire application at his desk, while other systems on the network could be idle.

Assigning subroutines

Furthermore, the Apollo system will be able to assign subroutines to systems that are more suited to processing these subroutines than the workstation itself, the vendor said.

NCS is made up of a series of components that perform two basic functions. One provides an environment that will allow applications to be dispersed and processed across the network, and the other provides tools that will allow users to create such applications.

The first major component of the Apollo system is the Remote Procedure Call Runtime Environment (RPCRE), which is responsible for packaging, sending and receiving, as well as error correction of the subroutines that will be processed across the network. This software, part of the source code that Apollo will offer, must reside on each network node that is participating in NCS.

Location Broker

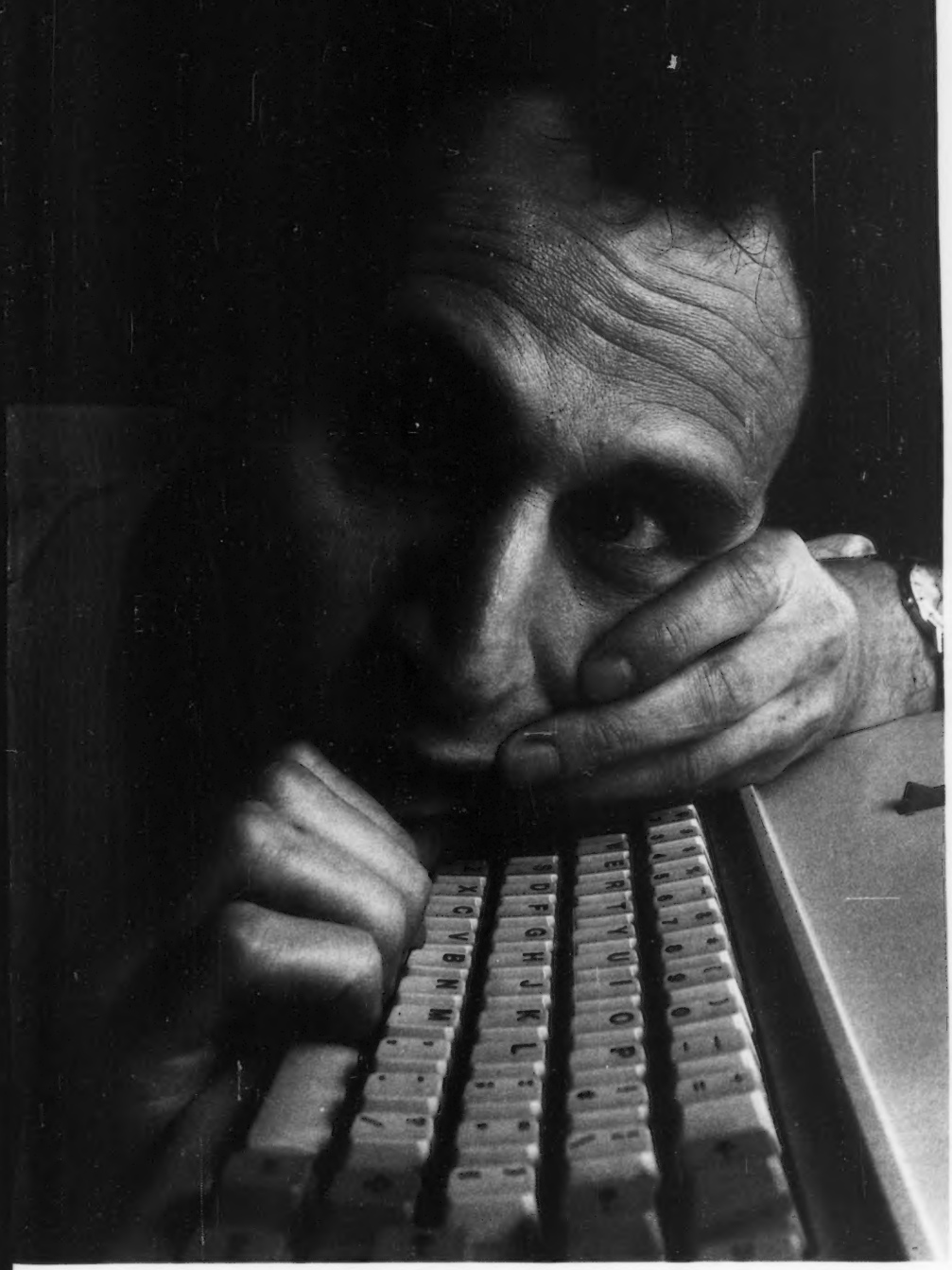
The second component is called the Location Broker, which is actually part of the RPCRE. It can be thought of as a data base portion of the runtime environment in which information on the system's nodes is stored. The Location Broker is responsible for coordinating the remote processing. By monitoring the network activity, it can assign a processing task to the most suitable system while an application is running.

For example, there may be two large DEC VAX systems on a network, both of which are capable of processing a subroutine of a simulation application. However, at the time the user is running his application, one of those VAXs is being used by other engineers. The Location Broker will alert the second VAX for the subroutine processing.

The third major component consists of the tools a user will need to write applications for the system. The first tool is a high-level language introduced by Apollo last week called the Network Interface Definition Language, which the vendor said supports either C- or Pascal-like syntax. Secondly, there is a new compiler, called the Network Interface Definition Compiler, which will compile the new language into C source code that can run on the NCS nodes.

Apollo's scheduled third-quarter product release will including the following: the Network Interface Definition Compiler priced at $1,000 per node or $8,500 per site; the Network Interface Definition Language Source Code at $25,000 for non-Unix and non-VMS systems; the Network Computing System Unix Runtime Source Code at $1,000; the Network Computing System VAX/VMS Source Code at $1,000; the Network Computing Architecture Public Specification priced at $80; and the Apollo-specific Network Computing System Documentation and Runtime Source Code at $250.

Systems staff sanity.



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IBM bears brunt of drop in its mid-range sales

BY CLINTON WILDER
CW STAFF

ARMONK, N.Y. — IBM's 27% profit decline in 1986 was mainly attributable to sharply lower U.S. sales of microcomputers, mid-range systems and peripherals, according to detailed year-end financial statements obtained by *Computerworld* last week.

The statements, which will be included in IBM's forthcoming annual report, showed that U.S. revenue in both the peripherals and office systems and workstations segments plummeted by 24% in 1986. Domestic sales of office systems and workstations fell to $4.66 billion from $6.14 billion in 1985, while U.S. peripherals sales declined from $7.31 billion to $5.57 billion.

Despite what IBM called "substantial growth" in large-processor revenue as it ramped up shipments of the 3090 series, revenue from the segment labeled processors decreased 5% in the U.S. to $5.5 billion. The segment had declined by 9% in the U.S. for 1985, because the 3090 product cycle did not begin until the fourth quarter of that year.

In 1986, IBM indicated, it took the brunt of lower sales in the beleaguered mid-range. Lower mid-range revenue brought the entire category into negative growth in the U.S. and reduced worldwide processor growth to 9%.

The office systems segment includes all IBM Personal Computers, intelligent workstations and typewriters. The 24% drop provided dramatic evidence of the pricing pressure, increased competition and slower demand besieging IBM in the U.S. micro industry.

The office systems segment's revenue declined by 10% worldwide, as international sales in all segments benefited from the decline of the U.S. dollar.

IBM estimated that its corporate net income of $4.79 billion would have been lessened by 13% without the favorable currency changes.

Peripherals include terminals, printers, copiers, storage devices and telecommunications products. The segment's 24% drop in the U.S. followed a 6% rise in 1985. Peripherals sales were down 11% worldwide, to $11.26 billion.

IBM's revenue from the software and maintenance services segments were both up 9% in the U.S. in 1986.

SAS aiming at business world

Seeks to tie SAS System to mainframe DBMS, low-end VAXs

BY CHARLES BABCOCK
CW STAFF

DALLAS — The SAS Institute is making a concerted effort to tie its well-known statistical, graphics and reporting SAS System to mainframe data bases and the low end of the Digital Equipment Corp. VAX line.

Recent moves by the company indicate it is seeking to move beyond its reputation as a supplier of graphics and statistical analysis software — the name SAS stems from statistical analysis software derived from research at the University of North Carolina — and working to tie into key products serving the corporate business world.

On the same day as DEC's announcement of its low-end Vaxstation 2000 last week, SAS officials told attendees at its users group conference in Dallas (see story page 23) that a version of the SAS System will be available to run on the DEC workstation by this year's second quarter.

The Cary, N.C., software company is also producing an interface to IBM's DB2 that is expected to be introduced sometime in May or June. The menu-driven interface will generate SQL statements that query DB2 and provide data for use in SAS applications. SAS users will also be able to update DB2 through the interface. No price has been set, spokesmen said.

Late in 1987, SAS will announce an interface to Cullinet Software, Inc.'s IDMS/R data base management system, spokesmen said. No pricing has been announced.

In addition, SAS Institute President Jim Goodnight said his company wants to be a competitor in the data base management field with the relational product it acquired from Intel Corp. two years ago, the System 2000.

The data base product retails for $10,000 to $12,000, officials said. Goodnight acknowledged, however, that the installed base of the product remains small, at about 500 units.

Conversion on target

In addition, Goodnight reported that the process of redesigning the SAS System and converting it into the C programming language is proceeding on schedule. The conversion and product testing is not expected to be completed before early 1989.

Goodnight said SAS Institute engineers and beta-test sites "will probably test Version 6 more than any product we have shipped. We will have to have complete upward compatibility" for existing applications written in SAS's proprietary fourth-generation language.

The SAS System currently runs on IBM mainframes, DEC VAXs and 11/70s and IBM Personal Computers. The conversion to C will mean SAS "will have a single system we can move forward very rapidly," Goodnight said.

The SAS System ran exclusively on IBM mainframes until the fall of 1984, when the first VAX software was announced. Personal computer products soon followed, and Goodnight said SAS is seeking to round out its PC product line.

"Every capability on the mainframe will exist on the PC," he claimed.

The base SAS System is licensed for $5,000 to $12,000, with the low range reserved for minicomputers and the high range for the IBM 3090 mainframe, Goodnight said.

In addition, SAS officials announced SAS/Share, which provides users with simultaneous access to information stored in SAS System data libraries. License fees range from $2,000 to $3,000 the first year, with a two-thirds fee collected each succeeding year.

Cray courts Fortune 500 with downsized $2.5 million X-MP

BY JEAN S. BOZMAN
CW STAFF

MINNEAPOLIS — Cray Research, Inc. opened the door last week to a new class of users for its supercomputing systems — commercial enterprises in the Fortune 500. A downsized version of the X-MP series has lowered the price of entry to Cray supercomputing to $2.5 million.

The X-MP/14SE is the slowest X-MP model available, performing 275 million floating-point operations per second (MFLOPS) — about one quarter the power of an X-MP/4 — for a fraction of the X-MP's average $14 million price.

The announcement of the entry-level X-MP was accompanied by the introduction of three other models — the $8.5 million X-MP/116, the $14.5 million Cray-2/4 and the $12.5 million Cray-2/2. However, the X-MP/14SE units will be the only Cray machines that cannot be upgraded to higher models.

Cray's X-MP product line now ranges from the $2.5 million X-MP/14SE, a single processor with 32M bytes of memory, to the high-end X-MP/416, a 128M-byte, four-processor unit priced at $16 million. The Cray-2 line now has three models, including the 1G-byte, two-processor 2/2, the 1G-byte 2/4-128 and the older 2G-byte 2/4-256.

There are now 11 X-MP models, excluding two older one-processor models that were withdrawn from the market this week, the X-MP 11 and the X-MP 12. There were also three price reductions in the Cray lineup: the top-of-the-line Cray 2/4-256 was reduced from $17.6 million to $17 million, the X-MP 24 from $8 million to $7.5 million and the X-MP 22 from $7 million to $6 million.

The wider array of products is expected to draw new and repeat business for Cray, which generated $596 million in revenue and $125 million in profits last year. Until now, Cray had only about 100 users around the world and only 150 machines installed. Most customers are U.S. government agencies, oil companies and foreign governments. Production has been steady but limited, with just 35 X-MPs produced last year.

The intent in introducing so many models over a wide range of performance is to widen Cray's user base. "Instead of the supercomputer market maturing, we see that it continues to expand," said Robert Ewald, vice-president of commercial marketing at Cray.

Users eagerly waiting

Users seem to be eagerly awaiting the delivery of the entry-level X-MPs in the third quarter of this year, along with the other new machines. "There was always a large gap between the highest level [Digital Equipment Corp.] VAXs and the smallest Cray," said Peter Patton, director of the University of Minnesota Supercomputer Institute, which operates a Cray 2.

Now, Patton said, users at universities and large commercial companies may find that the low-end X-MP price tags, ranging from $2.5 million to $7 million, are not terribly higher than IBM's.

Industry analysts were also pleased by the move. "This will open up more sales from cost-conscious customers," said Michael Orsak, an analyst with San Francisco investment banking firm Robertson, Colman & Stephens. He projected Cray revenue at $750 million for this year — with even greater revenue possible as time goes on.

The revamped lineup of Cray machines offers a wide range of performance. The low-end X-MP 14SE will run at 275 MFLOPS, Ewald said, while the high-end X-MPs offer slightly more than 1 billion FLOPS, and the Cray 2 offers about 2 billion FLOPS. Those numbers are theoretical maximums, and actual performance will vary by application, Ewald said.

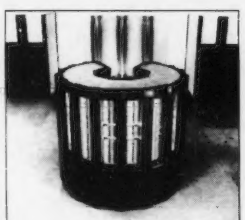
Cycle time for the new machines will not differ from that of previous Cray 2 and X-MP models, with the exception of the X-MP 14SE. That unit will run about 75% slower than the 8.5-nsec cycle time of other X-MPs. Cray 2 models will run at 4.1 nsec, Cray spokesmen said.

Another new feature, called the HSX high-speed external channel, will now be available for all Cray systems. This external channel will link Cray supercomputers with other Cray computers, peripheral devices or computers made by other vendors. Running at 100M byte/sec., the HSX channel will operate at distances up to 50 feet.

Latest Cray Research supercomputers

Model	CPUs	Memory	Performance	Cycle Time	Price (in millions)
2/4-128	4	1G byte	2GFLOPS*	4.1 nsec	$14.5
2/2-128	2	1G byte	2GFLOPS	4.1 nsec	$12
X-MP/116	1	128M bytes	1GFLOPS	8.5 nsec	$8.5
X-MP/14se	1	32M bytes	275MFLOPS	14.8 nsec**	$2.5

* Floating-point operations per second
** Estimate



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Al Gerney

Al Gerney
Director, Information Resource Management
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Novell policy shift seen paring dealers in favor of direct sales

BY PATRICIA KEEFE
CW STAFF

OREM, Utah — Dramatic changes in Novell, Inc.'s distribution policies could result in lower prices and an initial drop in support for users of the company's networks, distributors predict.

Novell has asked its distributors to sign contracts stipulating software quotas between $1 million and $3 million. Distributors also are required to purchase 10%, or $100,000 to $300,000, of the agreed-upon volume up front.

"They want to sell a lot of their software," observed one distributor, who added, "The more software you take up front, the higher the discount, the heavier the carrying cost."

The up-front purchases could lead to a shakeout among Novell distributors, forcing as many as half to drop the product, several distributors predicted.

Distributors said they believe the strategy will require some users to obtain support-only contracts with the remaining Novell partners, while others will buy products directly from the company.

"I absolutely think Novell will start selling direct [to users] in a major way," said Ian Ebel, president of Microserv Technologies Corp. a Novell distributor based in Boston. He said some of his dealers told him they have already seen moves and orders in that direction.

Repeated efforts to obtain comment from Novell were unsuccessful.

In addition, distributors claimed the requirement to purchase large amounts of software up front is sure to incite a price war, if not lead to the availability of Novell's Netware network software through mail order.

"Distributors are sure to find a home for that software. It's too much software [to take on at one time] to be nice guys about it," said Terry Green, president of CPU Corp., a Novell distributor in Houston, and president of the LAN Group, a consortium of five Novell distributors.

The excess software could resurface in the gray market, which is typically fed by distributors and dealers who have more products than they can sell or afford to carry in inventory.

Novell's products require a lot of support, according to Ebel.

"I'm not sure that Novell has the support network in place to support all these customers. There's a chance that the whole thing could backfire in a very bad way for Novell," Ebel said. "We have tried to convince Novell that they need the whole support organization out there."

Sprint word processor adopts others

SCOTTS VALLEY, Calif. — Borland International, Inc. last week announced a word processing program that allows the user to configure almost all operating commands and can emulate those of other vendors' word processors.

A user could create a document under one word processing program's commands and read it under another using an automatic file-conversion command, according to Borland.

The product, Sprint: The Word Processor, reportedly will be able to emulate file structures and respond to commands from word processing products by Micropro International Corp., Word Perfect Corp., XYQuest, Inc. and Ashton-Tate, according to Borland.

Business-user appeal

Borland aims to appeal to business users who may have several word processing programs in use in a single office.

The writers may sometimes need to share documents but resist switching from the word processing programs with which they are familiar.

Sprint: The Word Processor costs $195 and is scheduled for release in the second half of this year.

J. C. Penney lured to Supercalc4

BY DOUGLAS BARNEY
CW STAFF

NEW YORK — The appeal of an unlimited site license was enough to lure J. C. Penney Co. from Lotus Development Corp.'s 1-2-3 to Computer Associates International, Inc.'s Supercalc4.

"The key reason was the price and the fact that we are used to centralized control," said Hal Menzel, senior technical specialist for J. C. Penney in Dallas. The agreement allows J. C. Penney to centrally acquire and distribute Supercalc4. There are also some nice features in the product, according to Menzel.

The licensing agreement allows for an unlimited number of copies to be used by J. C. Penney, and the bulk of new spreadsheet users are expected to use Supercalc4. J. C. Penney's DP department paid for the license and maintenance agreement and will charge users $39 for a complete package. "I suspect most people are going to be ordering [Supercalc4] rather than getting Lotus," Menzel said.

J. C. Penney had nearly standardized on 1-2-3 and had developed a set of 18 standard macro files to improve productivity and control costs. Those macros are now being converted to run on Supercalc4. Supercalc4 also reads and writes Lotus 1-2-3 files.

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□ REASON #1: AI OPTIMIZES QUERY PROCESSING.

V5 applies artificial intelligence to SQL query optimization. For example, few DBMSs can optimize the query "Select accounts 90-days overdue **and** accounts over $10,000." But only ORACLE can optimize "Select accounts 90-days overdue **or** accounts over $10,000."

□ REASON #2: ARRAY PROCESSING OPTIMIZES ACCESS TO LARGE SETS OF DATA.

Relational DBMSs have always dealt with **logical** sets of data. But they manipulated only one **physical** record at a time. V5 eliminates overhead by physically delivering arrays of hundreds, even thousands, of records at a time.

□ REASON #3: PARALLEL-PROCESSING OPTIMIZES COMPUTER RESOURCE USAGE.

V5 is 100% re-entrant shared code, and ORACLE's parallel-processing architecture fully exploits modern dyadic and quadratic processors from IBM, and other multi-processing computers such as those from DEC and Stratus. So ORACLE uses all the MIPS in parallel-processor configurations.

□ REASON #4: MULTI-TABLE CLUSTERING OPTIMIZES JOINS.

ORACLE stores data from different tables on the same physical disk page. This technique—called *multi-table clustering*—permits you to access data from multiple tables in one disk read operation. Clustering improves ORACLE performance on all multi-table operations, such as join queries, update transactions, etc.

□ REASON #5: HIGH-SPEED RELATIONAL SORT FACILITY OPTIMIZES DATA AGGREGATION

Ad hoc relational queries frequently request that data be grouped, ordered or otherwise sorted. V5's internal sort facility performs aggregation and elimination early, faster than previously thought possible.

□ REASON #6: EFFICIENT ROW-LEVEL LOCKING OPTIMIZES TRANSACTION THRUPUT.

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Montgomery ..... Jan 29
AR Little Rock ..... Jan 20, Mar 27
AZ Phoenix ..... Dec 2, Jan 28
Tucson ..... Jan 29, Mar 25
CA Concord ..... Feb 11
Los Angeles ..... Dec 16, Jan 15, Feb 10, Mar 11
Newport Beach ..... Jan 20, Mar 17
Sacramento ..... Jan 13, Mar 10
San Diego ..... Jan 8, Mar 3
San Francisco ..... Dec 9, Jan 8, Feb 4, Mar 12
San Jose ..... Jan 22, Feb 12, Mar 26
CO Colorado Springs ..... Jan 15
Denver ..... Dec 10, Jan 13, Feb 13, Mar 17
CT Hartford (Farm.) ..... Feb 4
New Haven ..... Dec 4, Mar 25
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Dayton ..... Jan 7, Feb 17, Mar 18
Toledo ..... Jan 27
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OR Portland ..... Jan 7, Mar 24
PA Allentown ..... Mar 5
Harrisburg ..... Feb 11
King of Prussia ..... Feb 17
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RI Providence ..... Jan 21
SC Greenville ..... Feb 12
TN Memphis ..... Feb 11
TX Austin ..... Jan 28
Dallas/Ft. Worth ..... Dec 11, Jan 13, Feb 10, Mar 17
El Paso ..... Dec 18
Houston ..... Dec 4, Jan 15, Feb 12, Mar 12
Lubbock ..... Feb 20
San Antonio ..... Jan 29
UT Salt Lake City ..... Dec 4, Jan 29, Mar 24
VA Norfolk ..... Jan 21
Richmond ..... Feb 5
WA Seattle ..... Dec 11, Jan 14, Mar 3
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Teradata ties LANs into machine

BY CHARLES BABCOCK
CW STAFF

LOS ANGELES — Teradata Corp. is offering the Communication Processor, said to tie Ethernet or other local-area networks (LAN) into its data base machine, the DBC/1012.

The LAN tie-in is both a hardware and software addition to the data base machine that allows end users direct access to the large corporate data bases typically stored on it. The Communication Processor will work with any LAN that conforms to the IEEE 802.3 standard and utilizes either Transmission Control Protocol/Internet Protocol (TCP/IP) or International Standards Organization/Open Systems Interconnect (ISO/OSI) network protocols. Teradata officials said they plan to add support for the Xerox Network Systems protocol and the Manufacturing Automation Protocol by the end of this year.

The LAN tie-in is a departure for the 8-year-old company, which has previously limited access to its data base machines to users able to pass through an IBM host. "In the past, we were owned by the mainframe," commented Jon H. Gausman, Teradata sales director.

Software that manages a workstation session on the DBC/1012 is available for the IBM Personal Computer or compatibles or an AT&T 3B2 minicomputer running Unix System V. Support for Digital Equipment Corp.'s VMS operating system is planned by the end of this year, Teradata officials said.

By using an SQL-based PC interface such as the Portable PC/SQL-Link from Micro Decisionware, Inc. in Boulder, Colo., an end user may formulate SQL queries transmitted over an Ethernet LAN, according to Gausman.

S. Boyd Pearce Jr., Teradata vice-president of marketing, said the Communication Processor on the data base machine has a maximum of 64 concurrent users.

The Communication Processor and software is available immediately at a price of $39,000, with an additional $4,000 price on TCP/IP or ISO/OSI adapter. A PC interface license for 10 PCs is $5,000, with a 3B2 interface priced at $2,000, the spokesmen said.

Lotus to jazz up Mac debut

BY DOUGLAS BARNEY
CW STAFF

CAMBRIDGE, Mass. — Despite disappointing sales of Jazz, an integrated package for Apple Computer, Inc.'s Macintosh, Lotus Development Corp. is set to re-enter the Macintosh market with an announcement March 3.

The release, expected to coincide with Apple's announcement of two new Macintoshes, is essentially a new version of Jazz containing five enhanced modules: data base, spreadsheet, word processing, graphics and communications, sources say. It is unclear whether the product will be named Jazz.

In one of the most important enhancements, the spreadsheet module will be more closely aligned with Lotus's 1-2-3, a source close to the company said. One of the shortcomings of Jazz has been the lack of macros, and Lotus lost market share to Microsoft Corp.'s Excel.

The new Jazz is expected to include the 1-2-3 macro language and will read and write 1-2-3 .WKS files. The package is expected to be marketed along with the existing Jazz, not be a replacement for it.

Lotus's success against Excel with the new strategy depends upon the offering's quality, one user says. "There would have to be sufficient improvement to cause us to displace Excel," says Dick Webb, an audit partner with New York's Peat, Marwick, Mitchell & Co.

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3317-8707

Module sets aside memory

Unisys claims 40% power gain for A 12s, A 15s using cache

BY JAMES CONNOLLY
CW STAFF

DETROIT — Promising performance gains averaging 40%, Unisys Corp. last week announced a software disk-caching product for users of the company's largest mainframes.

The Software Disk Cache Module sets aside portions of main memory in Unisys A 12 and A 15 mainframes as dynamically allocable cache. The approach by Unisys differs from how some other vendors manage cache, which is on disk controllers. The advantage to the Unisys approach is that the Software Disk Cache Module allows users to move data from various disk strings into a single cache, according to William Maclean, Unisys program manager for system software.

Maclean said the greatest performance gains, were achieved by using the Software Disk Cache Module in I/O intensive applications, particularly applications in which data bases are not managed by Unisys's Data Management System 2 (DMS2). He said DMS2's buffers provide some of the same advantages.

The module, which requires Unisys MCP/AS Release 3.6.4, uses a minimum of 24M bytes of memory on the A 12 and 48M bytes of memory on the A 15. Maclean said approximately 170M bytes of the 192M bytes of maximum memory in the A 15 can be set aside for cache.

Available now, the module on an A 12 costs $5,280 per month on a monthly license or $258,720 for a five-year, extended-term purchase. The cost for an A 15 is $6,360 per month or $311,640 for a five-year purchase.

Intel soups up 80386 family

BY DAVID BRIGHT
CW STAFF

SANTA CLARA, Calif. — Intel Corp. will this week introduce a series of 80386-related chips it says will lead to faster, smaller and more efficient systems. The chips include a 20-MHz version of the 80386 microprocessor [CW, Feb. 2], two peripheral chips and a numerics coprocessor that was originally announced in October 1985.

According to Intel, the new microprocessor operates at between 4 and 5 million instructions per second, which is 25% faster than the 16-MHz version. This rating also puts the new 80386 ahead of Digital Equipment Corp.'s VAX 8600 and IBM's 4381 in terms of raw CPU performance.

Dave House, Intel Microcomputer Group vice-president and general manager, said that the immediate impact of the new chips will be seen in performance-critical areas such as computer-aided design, manufacturing and engineering and departmental-level computing.

The peripheral chips include an integrated-system peripheral that includes direct-memory access as well as major processor support functions and the 82385 cache memory controller.

The 80387 will perform floating-point operations for math-intensive applications. With the new 80386, 80387 and peripheral chips working together, the "full potential of 80386-based systems can now be realized," House claimed.

Because the 82380 Integrated System Peripheral eliminates the need for as many as 30 large-scale integration and very large-scale integration components in most applications, the chip reportedly will help systems manufacturers reduce design time and board space.

The 20-MHz 80386, the 82380 and the 80387 are available now. Intel said it will ship the 82385 in the second half of this year.

Operating system for 80386 lets users access existing applications, MS-DOS

BY DAVID BRIGHT
CW STAFF

MONTEREY, Calif. — Digital Research, Inc. announced last week that it had tailored its IBM Personal Computer AT-based Concurrent DOS Expanded Memory operating system to systems based on the Intel Corp. 80386.

Called Concurrent DOS 386, the new operating system is aimed primarily at multiuser environments that need to simultaneously run existing Microsoft Corp. MS-DOS applications packages. The operating system also runs Digital Research's CP/M-86 operating system.

Digital Research will initially sell Concurrent DOS 386 to OEMs and then move it into retail channels around May, according to Frank Iveson, sales director. Digital Research has already signed up two OEMs in the UK — Jarogate Ltd. and Comart Ltd. — he added.

The operating system uses the chip's Virtual 86 mode to run multiple 16-bit programs in separate 1M-byte sections of memory. While Concurrent DOS 386 supports the chip's 32-bit native mode and its 4G-byte address space, Digital Research will instead emphasize the operating system's multitasking capability for current applications, Iveson said.

That way, users can take advantage of the huge base of MS-DOS packages as well as the 1,400 vertical-market and general applications already available worldwide under previous versions of Concurrent DOS, Iveson added.

The operating system is expected to be available in early March.

Digital Research recently introduced the Flexos 386 operating system for industrial real-time environments using 80386- and Intel Multibus II-based systems (see story page 49).

Honeywell reports first deficit ever — $492M

BY CLINTON WILDER
CW STAFF

MINNEAPOLIS — Honeywell, Inc.'s final year in the computer business was a disastrous one, as the company last week reported a net loss of $492.8 million, or $10.94 per share, attributable to one-time charges and write-downs.

In addition, Honeywell noted that its only remaining computer operation, the Federal Systems Division, will turn over 50% of its profits to the new joint venture formed by Honeywell's Information Systems Division, Japan's NEC Corp. and France's Compagnie des Machines Bull.

The profit sharing plan has been negotiated among the three companies since the Dec. 2 announcement of the joint venture.

"I'm not sure why they decided to do it that way for accounting purposes," said Gary Blauer, analyst with Minneapolis-based Dain Bosworth, Inc. "Federal Systems will be buying a lot of product from the new venture, so it could just as easily have been put into prices. The new venture sees the division as a customer, and they are going to need customers."

When the new computer venture was announced, Honeywell said it was retaining U.S. ownership of the Federal Systems unit because most federal computer contracts are closed to non-U.S. vendors. The final structure of the yet-unnamed venture is expected to be announced next month.

Among largest losses ever

Honeywell's loss, its first in 60 years as a public company, ranks among the largest deficits ever reported by major computer vendors. Control Data Corp., in the midst of its fiscal crisis, reported a 1985 loss of $567.5 million, or $14.56 per share.

Honeywell took most of its major charges in the fourth quarter, including the $408 million, $9.04 per-share loss from the sale of 57.5% of Information Systems to the new venture. Honeywell sold the operation for $250 million below book value.

The company did not break out 1986 results for the information systems unit, since it is now accounted for as a discontinued operation. A spokeswoman said the computer division was profitable, excluding one-time charges, but the unit's profit was expected to fall significantly from its 1985 level of $200 million.

Dain Bosworth had estimated the division would earn just $90 million in 1986 [CW, Dec. 8].

In overall corporate results, income from continuing operations, excluding charges, fell 14% from $220 million, or $4.80 per share, in 1985 to $189 million. Charges of $134 million for consolidations and job reductions and $42 million for inventory write-down reduced Honeywell's actual 1986 operating income to $13 million, or 28 cents per share.

Honeywell Chairman Edson Spencer said the company's first-quarter 1987 profits would be flat compared with those of the year-earlier quarter but that net income would improve substantially during the rest of the year.

"It is now a whole different company with a new industry mix," Blauer said. "I think they will meet their targets, although their results are now more tied to capital spending growth than before."

For the year, Honeywell's overall corporate revenue grew 8%, to $5.37 billion, from $4.99 billion in 1985. Fourth-quarter revenue was also up 8%, from $1.50 billion a year earlier to $1.62 billion.

DPS 90 line gets 10% price slash

BY JAMES CONNOLLY
CW STAFF

PHOENIX — Honeywell, Inc. has cut prices on its DPS 90 mainframes by an average of 10%, a move the company said is intended to make Honeywell's largest systems more competitive with the IBM 3090 mainframe family.

The announcement came after IBM restructured and enhanced the 3090 line to improve price/performance ratios and after Honeywell officials reported that they expect to use recently introduced NEC Corp. processors in the DPS 90's successors.

The DPS 90 itself uses technology developed by NEC, which this month announced systems providing twice the performance of existing NEC systems.

All five models of the DPS 90 family are affected by the cuts.

The price of the uniprocessor DPS 90/91 was cut from $3.95 million to $3.55 million. The dual-processor DPS 90/92 was reduced from $5 million to $4.5 million, and the redundant dual-processor DPS 90/92T was cut from $6.25 million to $5.625 million. The three-CPU DPS 90/93 was reduced from $7.3 million to $6.5 million, and the four-CPU DPS 90/94 was cut from $8.35 million to $7.6 million.

Monthly maintenance prices were also reduced. For example, the maintenance charge for the DPS 90/91 was cut from $6,250 to $5,625.

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EDITORIAL

Cloudy Blue skies

IBM HAS CHOSEN an unusual time to declare 1987 "The Year of the Customer."

At an Orlando, Fla., gala for 150 of its biggest users two weeks ago, IBM brought out its top executives to kick off the new campaign with three days of back-slapping, cheerleading and whispering about future product plans. The message was simple: IBM cares about its customers and wants to listen.

Yet only a week before the Florida confab, a very different IBM gave its valued mainframe users a message that was shrouded in vagaries and thin on detail. The occasion was the announcement of the 3090E series, IBM's most powerful mainframes and a needed kick for the 3090 line, which has been suffering from slow sales of late. Three weeks after the announcement, many customers are still asking just what the E series means to them, what upgrade options they have and why IBM chose to spring the machines with so little advance notice.

The confusion is IBM's doing. When it unveiled the E series, the company told its current 3090 customers that in order to enjoy the 10% to 15% performance advantages of the new line they must, in fact, make two upgrades: one from their existing 3090 to a 3090E and the other from their current model to the next highest model in the series. Horizontal upgrades — for example, from a Model 150 to a Model 150E — are not allowed.

IBM was also evasive about what is really new in the E machines. Customers were told they will get a 3090E immediately if they have a 3090 on order. But users who have already taken delivery of a 3090 — even if it was only last week — must pay the full upgrade price.

IBM STATEMENTS SINCE the announcement have only further clouded the picture. The E models that will ship this month aren't full-function versions of the new machines, IBM said. Those will be upgraded in May. And an IBM spokesman admitted to a *Computerworld* reporter a week after the 3090E's debut that an upgrade within the same model is "technically possible," but that IBM won't help the customer do it.

IBM has long labored under the image that it exists only to sell more "iron." But in a market that is being driven by an increasingly shrewd breed of user and squeezed by some hungry competitors, it is in IBM's interest to shed that stigma as soon as possible. The more cynical IBM critics have already written off the 3090E as an IBM ploy to boost its bottom line at the expense of its customers. What's troubling is that some of those critics are customers themselves.

IBM owes its customers a clear and continuous statement of product direction, the kind that won't let them make expensive and embarrassing buying decisions. Users owe IBM an equally open response when the vendor's activities don't agree with them. The Year of the Customer is dawning, and it promises to be a pivotal one for both.

LETTERS TO THE EDITOR

Lucid documentation

Something important is missing in your article, "Intrapreneurship: Turning in-house projects to profit" [CW, Jan. 19]. Customers need and expect better documentation than in-house users do.

In-house users have probably seen the package develop. They also have easier access to technical support than do commercial users. So commercial documentation needs to be simpler and more thorough than documentation for in-house users. In addition, commercial users expect more graphics and better packaging.

Good documentation helps sell software by convincing potential commercial customers that their people can use the product. But good documentation requires careful planning and development — and that means time and money.

Last-minute documentation is often inaccurate, incomplete and poorly written; it may even make the package more difficult to sell.

Norman Boyer, Ph.D.
Consultant
Sandra Pakin & Associates
Chicago

PCTs and VDTs

Your article on display terminals, "VDTs: Doing more for less" [CW, Jan. 19], did your readers a disservice by not covering personal computer terminals.

Don't just take my word for it, because I'm sure market researchers at Dataquest, Inc. and International Data Corp. would both agree.

The PC terminal market grew at a faster rate than any other ASCII terminal segment. So much so that companies like ADDS, Ampex Corp., C. Itoh Electronics, Inc., Falco Data Products, Inc., Liberty Electronics Co., Televideo Systems, Inc., Visual Technology, Inc. and Wyse Technology, Inc. have chosen to enter it.

Yet your story did not contain a single syllable about what a personal computer is, what makes a terminal a PC terminal or what the PC terminals market is all about.

Robert A. David
Director of Marketing
Kimtron Corp.
San Jose, Calif.

This week in history

Feb. 21, 1977
A U.S. District Court judge decides to abort the California Computer Products, Inc. vs. IBM antitrust trial after three months of evidence against IBM.

The move leaves members of the dismissed jury frustrated and disappointed at not being able to see the case to completion since, before hearing IBM's defense, the majority of jurors leaned toward Calcomp.

Feb. 22, 1982
A Hollywood movie producer looks for used computers for "War Games," scheduled for release in 1983.

The United Artists' feature film's associate producer explains that banks of the hardware are needed in order to make the computer-room set look authentic.

Addressing Sec. 1706

Thank you for your editorial, "Declaration of independents" [CW, Jan. 19], on the impact of Section 1706 of the tax reform package on independent contractors.

I would offer that any reader who wishes to contact members of Congress regarding Section 1706 to please write Dean Gallo (R-N.J.) of the Small Business Committee, Minority Enterprise Subcommittee, and Robert A. Roe (D-N.J.), of the Science and Technology Subcommittee, in care of:

Congress of the United States
House of Representatives
Washington, D.C. 20515

George Moran
Kinnelon, N.J.

One hundred flowers

I enjoyed the Executive Report, "Parallel Processing" [CW, Dec. 22], very much. It was gratifying to see there is support for the coexistence of a great many approaches to super computing.

The old proverb, "Let a hundred flowers bloom," should not be attributed to Mao Tse-Tung. He appropriated it, adding the words, ". . . then pick them all at once." He was referring to his policy of encouraging dissent and pluralism for a few years, in order to bring those so inclined into the open; this was always followed by a ruthless purge.

I hope of the "hundred flowers" of superspeed computer architecture many bear fruit. Problems exist at many levels of granularity, and some primarily recursive algorithms cannot be parallelized at all.

Larry Van Stone
Conoco Inc.
Ponca City, Okla.

PC or paperweight? The boss goes off-line

GLENN RIFKIN

Johnson was the third guy to return from the executive suite disfigured. He looked at me in embarrassment, his face twisted into that frozen mix of a grimace and a smile of patience. Three hours was the record. Benson and Portnoy had each come back after two hours with that same bizarre contortion on their faces. Frankly, I was angry with the failure of the first two, but when I saw poor Johnson, I knew we were all in for a long siege. I sent him home and looked grimly upward toward the 25th floor.

The moment of truth, in fact, had come when they told me to head up the information center. Great, I thought, terrific. Lines of neophytes looking to me to lead them to the promised land. PC literacy spreads throughout the land on the wings of my every nod and comment. Grateful end users singing hosannas to the department chiefs about that wonderful guy at the IC, the guy who gave them The Power.

But even then I knew the call would come. It might be some executive assistant bucking for a promotion, but more likely the Head Honcho in MIS was looking for a pipeline to the front office. Get The Big Guy on a PC. Teach him Lotus, teach him data base management. Make him an Info Age swami and he'll be eternally grateful when budget time rolls around.

And who would they send to get Mr. Top Gun loaded? You got it. Let the info center do it. Aren't they responsible for end users and PCs? No problem. But why was the MIS guy snickering when he left my office? And why did his whole department look away and shake their heads when I passed through that afternoon? Doom, is why. No win, is why. Mr. Techvoid is on the throne and you get to bring him the news that the 20th century is passing him by.

So I sent Benson, then Portnoy and then Johnson. Three strikes. My turn to bat.

When I peered around the corner of his door, I shuddered a bit and involuntarily sunk backward. "Now, now, Mr. Barnes. He doesn't bite," his executive assistant urged, nudging me toward the office. "What's the matter with you techie types anyway?" she said as her fingers drummed the top of her word processor. I remembered her. She had been in the IC a year ago screaming loudly about how technology stinks and where was her Selectric.

When I entered, she closed

Continued on page 18

Rifkin is a senior editor for *Computerworld.*

Change for change's sake

Balancing centralized vs. distributed processing

EFREM MALLACH

The Flying Wallendas were one of the great trapeze acts of all time. Yet their most dramatic feats pale next to the balancing acts that MIS managers perform every day.

MIS managers spend their working lives balancing needs vs. resources, maintenance vs. development, standardization vs. flexibility, performance vs. software vs. people, overtime vs. schedule. From a strategic point of view, however, the most important balancing act is probably that of centralization vs. distribution of processing.

Most organizations begin in a centralized mode of operation. Anyone who installed their first system more than 10 years ago had little choice. (Remote batch terminals and data entry systems don't count.) Anyone whose first system is more recent must have started small with a single system.

At some point an organization realizes that (a) many of its business functions are inherently distributed; (b) local managers should be allowed to manage; and (c) technology permits computing to follow the business. Everyone starts talking about the dangers of putting all your eggs in one basket. The conclusion is distributed processing. Processors are purchased, lines are leased, programs are converted, files are split. Six months — or three years — later, everything is distributed. Each warehouse has its own supermicro.

Now what? The cry soon goes

Continued on page 18

Mallach is associate professor of computer science at the Boston College School of Management and a consultant to top managers of vendor and user organizations.

Why the sky is not falling

HERB GROSCH

My theses are very different from those of the moaners and groaners in Silicon Valley. I believe:

- The computer business is flourishing worldwide.
- The U.S. is far out in front of its rival, Japan, and will stay in front for at least 20 years.
- Chip-making is in great shape here and in Japan.
- Federal assistance, for instance in the funding of the construction of a chip superfoundry, is not needed.
- Pentagon intervention on the grounds of security is contra-indicated.
- The loudness of the cries for money or protection is in proportion to the greed and/or incompetence of the petitioner.

Growth around the world, in either financial terms or number of users, is between 10% and 15%, the exact figure depending on how you handle the home-computer part of the desktop business and, in the U.S., on how you handle military hardware and software. This figure compares with the historical rate from the mid-1950s to the early 1980s of 15% to 17%. These figures reflect the rate at which novel technology can be absorbed once pent-up initial demand is satisfied.

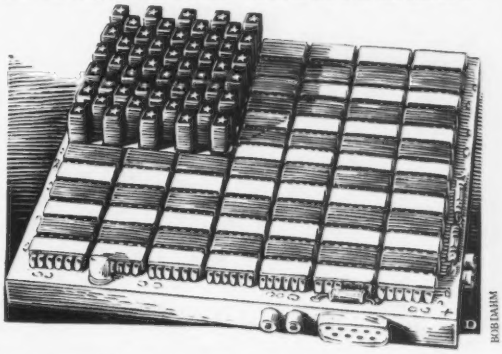
Do you suppose the shipbuilding, steelmaking and auto industries would complain if they had such a growth rate? If it continues, as new applications and wider education in working with information technology guarantee, our industry and its ancillaries will be the largest sector of both the U.S. and the international economies in a decade.

The sky is not falling. Then why does the press tell us it is? Two answers: The nicer one is that journalists are new to the game, having been charged up at the beginning of the personal computer boom. They find growth of less than 40% or 50% a year unexciting. One piece of evidence is the silly disproportion of attention to the smallest machines. To such people, mainframes and minis are complicated, jargon-ridden and boring.

The other answer is that stories that the sky is falling are exciting, are read closely and sell publications.

The key to continuing American dominance is research. Until the Japanese remodel their extremely good but rigid educational system and until family and employer support of that system is changed, there will be a major shortfall in the production of research men (and especially women). It isn't a question of ability. The great outfits like Fujitsu Ltd. and even the universities are vigorously working for change.

Yes, the Japanese beat us to each generation of memory chips. That takes development skills, exquisite manufacturing care and long-term investment of large quantities of money, all of which they have. We produce 80386 chips and such things as new microprocessors, reduced instruction set computing chips and hybrids. Both countries are doing beautiful work.



BOB DAHM

Do we want to get the lower priced random-access memory (RAM) production back? We could, with superb microrobotics and Class-One clean rooms and lots of money. With the same level of effort, we could get color TV production back. At best both are dog-eat-dog, low-profit scrambles, and both the U.S. and Japan would be well advised to move on to newer markets.

The well-publicized calls for a large federal investment in a superfactory to make superchips in superquantities are not being challenged loudly enough. Congressmen, computer manufacturers and concerned citizens are all saying, 'Well, even if it isn't necessary, it will help the semiconductor companies compete against overseas outfits.' That isn't what the chip makers want the taxpayers' money for. They want a free superfactory with which to compete.

IBM is already building a facility in East Fishkill, N.Y., as advanced and considerably larger than the one proposed by the Sematech consortium. And IBM is doing it without federal support, using its own experts, who are the best in the world.

There was a fine story supporting the idea of federal intervention by Bohdan Szuprowicz in the Dec. 8 issue of *Computerworld.* He emphasized the national security aspects, which are of deep concern to the Pentagon, and deplored the acquisition of Fairchild Semiconductor Corp. by Fujitsu. I wryly noted that he did not mention that the mainframes offered by ICL, PLC, Siemens AG, Honeywell, Inc., BASF Co. and Olivetti Corp. are all of Japanese design and manufacture.

Note that the factories that Fujitsu and NEC Corp. and Hitachi Ltd. and Toshiba Corp. might take over (or build) would be located in the U.S. and staffed almost entirely with Americans, which is much more secure in a national emergency than the chip foundries U.S. firms have built in Europe or the Far East. And note that Toshiba, for instance, is furnishing its advanced dynamic RAM know-how to Motorola, Inc. as Fujitsu doubtless plans to furnish its technology to Fairchild. Our security is increased by interactions with Tokyo.

There is a dark side to Pentagon support, and that is the restriction on exchange of technology across national boundaries, among companies with different levels of military commitment and even between American engineers and scientists. This is the greatest danger to national security and America's worldwide domination of information technology — not Russian spies, not Japanese manufacturing skills, not low Korean wages, but the perennial military desire to build a wall up to the sky and isolate our technical people from the rest of the world and each other.

I will not dwell on my sixth thesis, but simply restate it. Our industry is rife with greed, barred, in most cases by investor demands, from long-term planning and investment and heavily populated with frightened and incompetent executives. Proposals to tap the federal, and especially the military, till should be read with that in mind.

American computers are great. American chips are great. American research and development is great. Ignore the screams from the weaklings and cowards and press on.

Grosch is known for the relationship between computer speed and cost (Grosch's Law), which he discovered in the early 1950s. He has worked for IBM, General Electric Co. and the federal government and currently consults for companies in Europe, North America and Japan.

Paperweight

FROM PAGE 17

the door a bit too loudly behind me. The Big Cheese didn't look up for a long time. The AT, sitting precariously near the edge of his desk, looked like the monolith in *2001*. I half expected him to start banging bones on his desk and screeching.

He finally looked up at me and heaved a sigh of monsoon proportions. "Must we?" said his face. "Sit down," said his mouth.

The Big Guy hadn't arrived at where he was for nothing. The couch in front of his desk was several levels down from his eyes and it was made of a material into which one sank like quicksand.

"You realize, Mr. Barnes, that this machine has been on my desk for six months now and has yet to produce a meaningful blip of information," he said as he gently patted the cleanly dusted top of the AT. "I stare at it each morning and urge it to produce something worthwhile, something to justify its existence. But it simply stares back at me as if it were challenging me to produce something meaningful first."

"Cough, cough," I wriggle. "Hmmm."

"Now really, Mr. Barnes. I have listened patiently to my MIS chief, and I endured the tribulations of your emissaries. And what I sense here is a gap."

"A gap?" I reply.

"A gap, indeed," he bellows. "Do you know what I do virtually all day, Mr. Barnes? I'll tell you what I do. I talk to people. That's right. Talk . . . talk, talk, talk. I talk to them in person, I talk to them on the phone, I talk to them at lunch and dinner. I tell them what I want and they tell me how they will get it for me.

"And then I receive this miracle of technology, this key to competitive advantage and I immediately sense a gap. It won't talk to me. It won't even listen to me, and it doesn't tell me how it will get what I want. You send me people who tell me I must touch it and stroke it and make it feel wanted. And I say, let it make me feel wanted. I'm the Big Cheese, after all."

"But sir," I interrupt with a sense of panic rising in my throat. "It's not that hard. We've customized a program for you that gives you access to mainframe data and lets you do spreadsheets with simple commands. We've given you a hard disk so you needn't fuss with floppies and the communications pack— "

He is holding up his hand, ordering me to cease and desist.

"I've been at this company for 30 years, Mr. Barnes. We are a very big company and we make lots of money. I use some of that money to pay my accounting people to do the spreadsheets and when I want information, I pick up my phone and call someone. You'd be amazed at how quickly I get an answer."

I cleared my throat to respond, but he continued. "Productivity, Mr. Barnes, is in the eyes of the beholder. I like your spunk, but call me when you've got something I can use."

"Shall I take it with me?" I asked, shoulders slumped.

"Actually, no. I don't want to appear to be fighting progress. And it makes a hell of a paperweight."

I slouch toward the door.

"Oh, by the way, would you tell Ms. Lewis to come in . . . to take a letter."

Change

FROM PAGE 17

up for central applications. We want to switch our Pittsburgh customers from the Harrisburg supply depot to the one in Akron. Why did we ever split the distribution division into 16 kingdoms?

And so the Flying Wallendas' trapeze swings back. We install a central system to pull the supermicros together. We consolidate the data bases. We run more work at the central site. Soon the local micros are reduced to intelligent data entry machines. We're back where we were. Older but probably no wiser.

Does this mean we should never decentralize? That we should always decentralize? Of course not. What this means is that *we must resist the normal human temptation to deal with problems through change for change's sake.* If a centralized MIS shop has problems, distributing the processing will put problems in eight more places. If a distributed MIS shop has problems, centralizing will pile them all on top of each other in one room.

The organization's needs should be the determining factor in the issue of centralization vs. distribution. If you're in the gasoline credit card authorization business, 98% of your credit checks are for people within 100 miles of their homes. Use regional processors and set up a network for the other 2%. If you're in the national airline business, you need all your bookings in one place. Use a central system. It's that simple. Don't automatically do the opposite of what isn't working or the opposite of what your disgraced predecessor did. Just do what the business calls for. In short:

- Decide how information can best support the business needs.
- Set up your systems that way.
- Face any problems that come up within your system context, confident that your basic approach is sound.
- Change your approach only if the business needs change or if the technology changes so drastically that earlier tradeoffs no longer apply.

Do this and you still may not live happily ever after. But you will lose that sinking "Isn't this where I came in?" feeling you get each time the Wallendas' trapeze swings back to you.

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1. IBM PC is a registered trademark of International Business Machines Corporation.

P321 P341e

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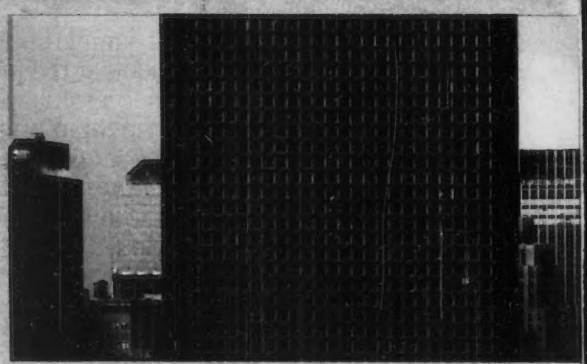

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SOFT TALK

Charles Babcock

Wanted: User SQL input

Some critics are viewing the Structured Query Language standard recently published by the American National Standards Institute (ANSI) as the captive of vendors who supply SQL with their relational data base products.

The fact that ANSI SQL so closely resembles IBM's SQL seems to indicate to vendors that the ANSI X3H2 committee gave away the ballgame before the first inning was over. After all, it is IBM that has failed to support use of foreign keys and other extensions of the basic SELECT, PROJECT and JOIN SQL statements.

To follow IBM's example in creating a standard is to hobble the standard with IBM's expediency in the marketplace, not to accomplish what might be possible technically, critics would say.

That line of thought is not necessarily fair to the X3H2 committee, but Chris Date of the Relational Institute has a point, I think, when he charges that the committee had a richer standard six months ago than the one that emerged from the standard-setting process.

Another critic, Sharon Weinberg, president of Codd & Date Consulting, a sister firm of

Continued on page 24

Users laud SAS portability move

BY CHARLES BABCOCK
CW STAFF

DALLAS — Customers of the SAS Institute, Inc. applauded the company's effort last week to convert its product line into portable C versions and to supply more SAS software to personal computer users.

But they questioned how quickly SAS would be able to improve its mainframe product line, given its concentration on conversion to C-based code, and they urged the company to improve the reporting capabilities of its mainframe base system.

These and other reactions were evident at the 12th annual meeting of the SAS Users Group International held here last week. About 3,000 users attended the conference.

At the opening session, SAS President Jim Goodnight told attendees that SAS development teams are in the process of converting the base SAS System and its add-on statistical analysis, data management, graphics and other applications into the C programming language.

The converted software has been redesigned to separate the user-oriented application and supervisory layers from the operating system layer. The new architecture will allow future releases of the SAS System to be available on PCs, minicomputers and mainframes simultaneously, Goodnight said. SAS software is currently written in assembler and PL/1.

Jim Goodnight

The converted products are expected to enter beta testing early next year but will not be issued as products until early 1989, he said.

David Wilson, a programmer analyst at New Mexico State University in Las Cruces, N.M., said a C-based product line would be a boon to SAS System users. "It's a great way to go. A programmer would be able to go from the mainframe to a PC, and his application would work on either one," he said.

Even though the current SAS product line looks much the same whether it is running on an IBM mainframe, Digital Equipment Corp. VAX or PC, "each environment has its idiosyncracies. There's enough differences to make it annoying moving between operating systems," said Pat Hermes Smith of the corporate management services group at CIBA-GEIGY Corp. in Greensborough, N.C., and president of the SAS Users Group International.

Continued on page 25

Developing on DB2 reaps high returns

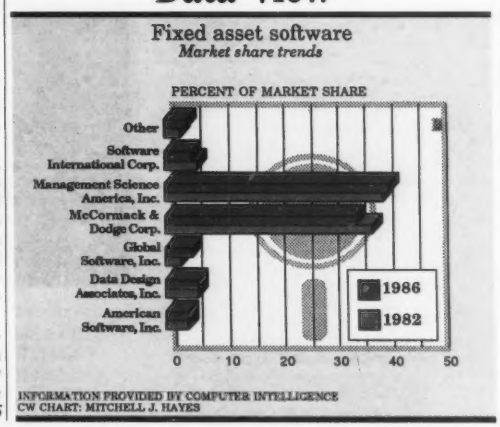
BY ALAN ALPER
CW STAFF

NEW YORK — Despite DB2's inability to support referential integrity, data processing shops using the IBM relational data base management system should use it to develop new applications in hopes of achieving productivity gains and cost savings.

That was the recommendation provided during a discussion sponsored by The Greater New York DB2 Users Group at the

Continued on page 25

Data View



INFORMATION PROVIDED BY COMPUTER INTELLIGENCE
CW CHART: MITCHELL J. HAYES

Unify lifts distributed DP systems

Architecture matches layers to processors

BY MITCH BETTS
CW STAFF

Unify Corp., a Unix software vendor based in Lake Oswego, Ore., recently announced a radically different architecture for its application development and data base management software that splits the application into three layers running on micro, mini and mainframe processors.

Unify's Cooperative Processing Architecture breaks the application into three components — human interface processing, applications processing and data base processing — and matches each layer to the most appropriate processor.

In an order-entry and sales tracking system, the data entry tasks would be handled by users at micros, the application would be driven by the mid-range processor, and the data base would reside on a departmental mainframe such as IBM's 9370, Unify President Nicolas Nierenberg said in an interview. Primarily, the architecture off-loads user-interface functions from Unix minis to increasingly powerful PCs, he added.

The second layer, which re-

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Inside

SQL input

CONTINUED FROM PAGE 23

the Relational Institute, told DB2 users in New York recently that the standard committee was dominated by SQL vendors who sat around eliminating SQL features that were not in their implementations. After all, the typical vendor might ask, What good is a standard if your product doesn't meet it?

So what happened, in Weinberg's view, is that the vendors flocked to the X3H2 committee and voted down the features that they didn't have, leading to what Weinberg calls "a least common denominator standard."

In talking with Donald R. Deutsch, manager of data systems at the General Electric Information Services Co. and chairman of the X3H2 committee, a picture emerges that isn't totally at odds with Weinberg's view.

"That's true. We have a least common denominator standard" reflecting current SQL implementations, he says. Furthermore, membership on the committee almost doubled during the last year as interested parties, including federal agencies but primarily SQL vendors, sought to participate in the standard-setting process, he says.

SQL, an IBM invention that has been around for a decade, came into its own last year with the widespread acceptance of relational technology. Deutsch correctly points out that the X3H2 committee is attempting to set an SQL standard swiftly on the heels of that phenomenon.

Cobol 85 brouhaha

One need only look at the brouhaha over Cobol 85 to realize the hazards of setting a standard for a widely used product, even one supposedly already adhering to a standard. Deutsch cites the example of the Pascal standard, "which lagged years behind Pascal's acceptance.

"The effort here was to get a standard out in front of the parade. Then we could place in the public domain the debate about SQL's extensions," Deutsch says.

This is an excellent point. By establishing a standard early, vendors will consult the latest round of debate within the X3H2 committee before heading off in their own direction with extensions. Even if multiple extensions do appear, the committee can highlight those that it is inclined to include in the next version of the standard. Deutsch says an addendum process has begun to try to capture the extension process and place it in the public forum.

Nick Rawlings, director of the technology department at Dun & Bradstreet Computing Services, points out another advantage of an early standard. It allows all vendors who wish to market SQL-based products to share a common subset of the language, guaranteeing a kind of minimum transportability of programs.

'IBM not under pressure'

However, Rawlings says, SQL gets hurt if the standard-setting process is allowed to sit for long in its present state, due to missing functions. In addition, "IBM isn't under as much pressure as it would be if we had a standard that incorporated features not in IBM's SQL," he notes.

If the vendors have won the first round by arguing for a least common denominator SQL, the SQL user community also won a round by creating a public process to further develop the language.

Where are the representatives from the growing community of DB2 production users who have the greatest stake in extending the SQL standard? If everyone is too busy implementing SQL applications to join the standard-setting process, users will find themselves stuck with a limited SQL that costs them efficiency for years to come. Some priority must be assigned, making users' needs paramount to the committee.

Or, as Weinberg told the DB2 users in New York, "To make it your standard, you've got to invest some skin in it."

Babcock is *Computerworld's* senior editor, software & services.

DP systems

CONTINUED FROM PAGE 23

sides on Unix supermicros and minis, controls the application's logic, data base requests, user algorithms and security checks. The third layer places the data base on a Unix-based supermini or mainframe computer. IBM VM and Digital Equipment Corp. VMS versions are forthcoming, and access to IBM MVS data bases will be provided via a standard SQL interface, the vendor said.

Initially, Unify is putting its Accell Integrated Development System, an application development product, under the new architecture.

Unify announced two products for the architecture — Accell/CP and Query/CP, which will be available in June. Accell/CP enables an Accell application's user interface to be off-loaded to an IBM PC-DOS micro while the application functions and data base continue to reside on the larger Unix system. Only Accell-developed applications work under the architecture.

Nierenberg said that Accell/CP will cost $100 to $200 and Query/CP will cost $400 to $500.

Nierenberg added that the Cooperative Processing Architecture goes a step beyond distributed data base systems, on which data is shared among various systems and departments. "The combination of data distribution and processing distribution is what we're calling cooperative processing."

Developing

CONTINUED FROM PAGE 23

World Trade Center recently. Marilyn Bohl, DB2 product manager, and Sharon Weinberg, president of Codd & Date Consulting Group in San Jose, Calif., answered questions from users after addressing the group.

One user, who runs both IMS, IBM's established DBMS, and DB2 in his shop, asked why he should develop a new application using DB2 if he has a simple parent-child relationship that requires referential integrity.

Weinberg responded that users should develop applications using DB2 because the return on investment (ROI) is much greater than with IMS. The ROI using DB2 was 95.3% during a five-year period vs. 53.6% when using nonrelational data bases, she said.

'Relational the key'

The gain is achieved through a shorter development cycle and greater ease of maintenance. "It's been determined that relational is the key to this," she said.

The fact that IBM is using terminology like "secondary keys" — rather than foreign keys — and has yet to implement domains, means the firm is a long way from supplying these features, Weinberg said. She criticized IBM for being slow to provide referential integrity, which allows a DBMS to match changes in a primary key with a foreign key, maintaining the integrity of data.

"If you want to create rot in your data base, like you have in IMS for the last 18 years, that's well and fine," she said. "But I can assure you that the board of directors of your company, CEO and vice-president don't want your companies to rely on junk to make their decisions."

When asked if tables created without referential integrity would be affected once it became available, IBM's Bohl said, "Many of the things needed for referential integrity indeed already exist in the catalog for any new release that may come along. Certainly, it is our intent to minimize the impact."

Some users say they are experiencing productivity gains using DB2 to develop applications. Mark Karpilovsky, a consultant and panel member, said he is currently working on a project in which two production systems supporting more than 100 users are running on a dedicated mainframe.

"The first DB2 application we developed consisted of about 17 or 18 programs, 18,000 lines of code," he said. "I'd say the total gain in development time was about 25%."

One user asked when IBM would provide an on-line performance monitor for DB2. "It's kind of hard for me to accept having a state-of-the-art data base engine and a batch monitor that lets you look at reports a day or two later," he declared.

Bohl said IBM has yet to draw up plans for developing an on-line monitor. "It's a well-understood requirement," she said.

Users laud SAS

CONTINUED FROM PAGE 23

In addition, a C-based product line that was transparent across operating systems could install very quickly, she said.

Redoing the underlying architecture is also a necessary move. "I think SAS Institute found itself building a house one room at a time. At some point they said, 'Maybe we should get some structure in here,'" Hermes Smith said.

Wendell Refior, research analyst with Boston Edison Co. in Boston, recommended that SAS Institute produce "more complex report writing capability with complete customization features.

"You don't have enough flexibility to do the things you want — to do a printout phone book-style or stop halfway down the page with a new heading and indentation," he added.

Report-writing tops wish list

Goodnight said in an interview that the SAS base product allowed a large number of reports to be generated "with one or two statements." He acknowledged that complex report writing procedures remained near the top of the list of SAS users' wishes in an annual ballot of SAS users' needs.

The base SAS System and many add-ons are available under DEC's VMS operating system and PCs as well as IBM mainframes, where the product line was concentrated exclusively until late 1984. Several SAS users urged further expansion of the PC product line.

SAS Institute is working on linking SAS products that run under DEC's VMS operating system to PCs via a link that will move data sets across the link with a single statement, said Greg Steer, a biologist with the Canadian Department of Fisheries in Nanimo, B.C., as he exited an exhibit room that included a demonstration of the link. The VMS-to-PC link will go into beta test this month, he said.

SAS spokesmen said PC versions of SAS Applications Facility, SAS Graph and SAS Full Screen Product will be announced later this year.

Another SAS user on PCs, Kenneth Whitesides, an information center consultant at Duke Power Co. in Charlotte, N.C., said the Institute needs to find ways to work around the 640K-byte memory limit on PCs.

Duke Power attempts to use the SAS PC base product and SAS/Stat on IBM 3270 PCs and finds it can only upload or download limited data sets with the memory that remains.

NEW PRODUCTS

Systems software

Kolinar Corp. has introduced **Release 1.3** of its **SQL/Exec**, a VM/CMS product for users of IBM's SQL/DS.

SQL/Exec is said to allow users to execute any SQL command from Exec2, Rexx or the IBM CMS command line. It helps users build a custom data base application. Features of Release 1.3 include simplified installation and faster execution speed. Other features include automatic error-message handling, timing and operator commands and substitute symbols for null values.

SQL/Exec is priced at $6,000. Optional maintenance costs $1,000.

Kolinar, 3064 Scott Blvd., Santa Clara, Calif. 95054.

Sterling Software has announced **Release 7.5** of its **DMS/OS** data storage management system.

Major improvements in DMS/OS Release 7.5 include the ability to back up and recover catalogs. Enhancements to program development system handling are said to permit processing of data sets in which logical errors have been detected as well as merging individual members into a library from backup or archive copies.

Improvements in archive and backup management include the ability to merge onto disk any unexpired data sets from the archive or backup medium and to produce duplex copies.

The basic DMS/OS system is priced at $14,000.

Sterling Software, #100, 11050 White Rock Road, Rancho Cordova, Calif. 95670.

Computer Associates International, Inc. has announced **Release 1.0** of its **CA-Optimizer II**, a code optimization, debugging and source analyzation product that supports the capabilities of IBM's Cobol II and MVS/XA operating environments.

CA-Optimizer II is said to provide a split-screen Cobol II language Help facility. Other enhancements include optimization techniques enabling the optimizer component to handle programs up to eight times larger than previously possible.

CA-Optimizer II Release 1.0 is priced at $48,000 for IBM's MVS and MVS/XA operating environments.

Computer Associates, 711 Stewart Ave., Garden City, N.Y. 11530.

RD Labs, Inc. has announced **Release 3.3** of its **RD/Share** library management and control system for IBM's VM/CMS environment.

RD/Share is said to provide for version control of source files, auditing of changes, security over access of files under the system's control, prevention of concurrent updates, data compression and management reports.

Release 3.3 includes a new Rexx-based guard file facility and the ability to pre-emptively trap and disallow transactions without communicating with the service machine.

RD/Share Release 3.3 is priced from $5,675 to $13,675 per CPU.

RD Labs, P.O. Box 255832, Suite A, 1783 Tribute Road, Sacramento, Calif. 95865.

Applications packages

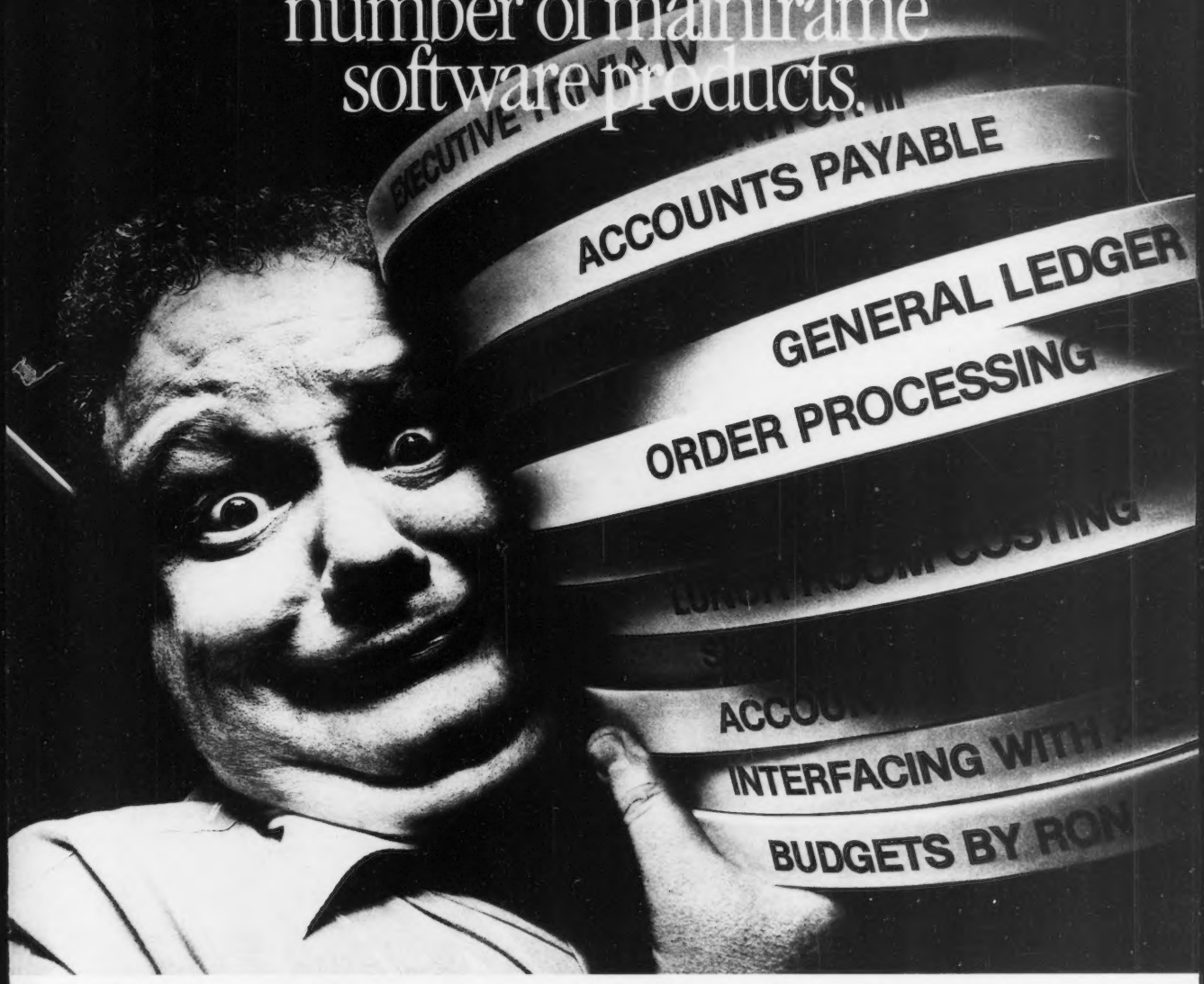
Tigera Corp. has announced **Word Era**, a word processing program for multiuser Unix-based systems.

Word Era includes a Wang Laboratories, Inc.-compatible interface and document conversion capabilities. It supports the windows environment as well as voice recognition and voice annotation. Other features include math function support for screen and keyboard input; block copy, move and delete functions; full-featured footnoting; password protection; index and table of contents generation; and spelling checker.

Word Era is priced from $895.

Tigera, 350 Bridge Pkwy., Redwood City, Calif. 94065.

We don't make an exceptional number of mainframe software products.



Some large software companies aggressively sell the single vendor idea. Unfortunately, the benefits of using this approach can be far outweighed by inconsistent quality and poor integration across a multi-application product line. Opting for one vendor may force a user to settle for some second-class products that ride on the coattails of good ones.

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Access Technology, Inc. has announced **Release 2** of its **20/20** integrated spreadsheet software for AT&T's 3B2, 3B5, 3B15 and 3B20 computers.

Release 2 features more than 50 enhancements, the vendor said. Specifically, additions include optional letter and number cell notation; advanced macro capabilities, including work sheet-based macros; new range commands, including range name; global and local rounding; work sheet password protection; and an enlarged matrix.

Other features include an expanded data import/export capability and improved ability to move spreadsheet models between computers.

20/20 Release 2 for the AT&T computers is priced from $1,200 to $5,800.

Access Technology, 6 Pleasant St., S. Natick, Mass. 01760.

Data Center Software has announced **Watch**, a calendar and phone book management system for Digital Equipment Corp. VAX and Microvax computers.

Watch is said to maintain personal or project schedules and other timely events. It will print or display any selected entries for any given time period. The phone book feature can support multiple names and telephone numbers for a single entry, and any selected entries can be printed or displayed.

Watch is priced from $450.

Data Center Software, 447 Old Boston Road, Topsfield, Mass. 01983.

State of the Art, Inc. has added three accounting application modules to its **MAS 90 Master Accounting series.**

The three modules include Inventory Management, Sales Order Processing and Purchase Order Processing. They can be integrated with other MAS 90 modules such as General Ledger for comprehensive reporting, the vendor said. Features of the accounting series include the ability to generate numerous management reports.

The modules are priced at $795 each.

State of the Art, 3191-C Airport Loop, Costa Mesa, Calif. 92626.

MCBA, Inc. has announced its **Labor Performance** package for the Wang Laboratories, Inc. VS line of computers.

The package was designed to help businesses track employee production statistics, identify productivity problems and improve labor utilization. It supports clock-card entry and editing and, by integrating with MCBA Payroll, permits the payroll to be calculated automatically from clock-card data.

Other features include the ability to analyze performance productivity, use files created by data terminals, allow centralized labor transaction entry and provide for an incentive system.

Prices for MCBA's accounting, distribution and manufacturing software for the Wang VS family range from $2,000 to $12,000.

MCBA, 425 W. Broadway, Glendale, Calif. 91204.

Utilities

Iris Software has announced **Version 2.0** of its **Dgen/36** software for the IBM System/36.

The product is said to generate on-line Report Program Generator (RPG) program documentation. Version 2.0 offers an enhanced RPG listing procedure featuring action diagrams connecting all DO, IF and CASE statements with their matching END stations. Also, all GOTOs and TAGS are bracketed. Field length and array information can be printed to the far right of each I-, C- and O-spec line and double-defined, and unreferenced fields are flagged.

A single CPU license costs $295.

Iris Software, P.O. Box 4594, Suite 219, 119 Broadway, Chico, Calif. 95927.

J. D. Edwards & Co. has announced **Fastr**, a financial report writer for use with its World Systems for the IBM System/38.

Fastr is said to extract information from World Systems accounting data bases. Any category of data defined in the chart of accounts can be selected, sorted and printed in a specific financial statement.

Design capabilities include exception and variance reporting, multiple levels of subtotaling and control of column and row formatting.

Fastr costs $7,000.

J. D. Edwards, Suite 5500, 4949 S. Syracuse St., Denver, Colo. 80237.

Application Development Systems, Inc. has announced **Xpediter/CICS**, a testing and debugging package for IBM mainframes running under MVS or MVS/XA.

Xpediter/CICS is said to provide source-level testing and debugging for CICS application programs in the CICS region. It features user commands and a scrollable full-screen source code display. It can be used to control the execution of the program, display and change variable values and simulate unwritten code. It can also intercept application abends and prevent application programs from accessing storage associated with other CICS tasks.

Xpediter/CICS is priced from $19,000.

Application Development Systems, 6840 78th Ave. N., Minneapolis, Minn. 55445.

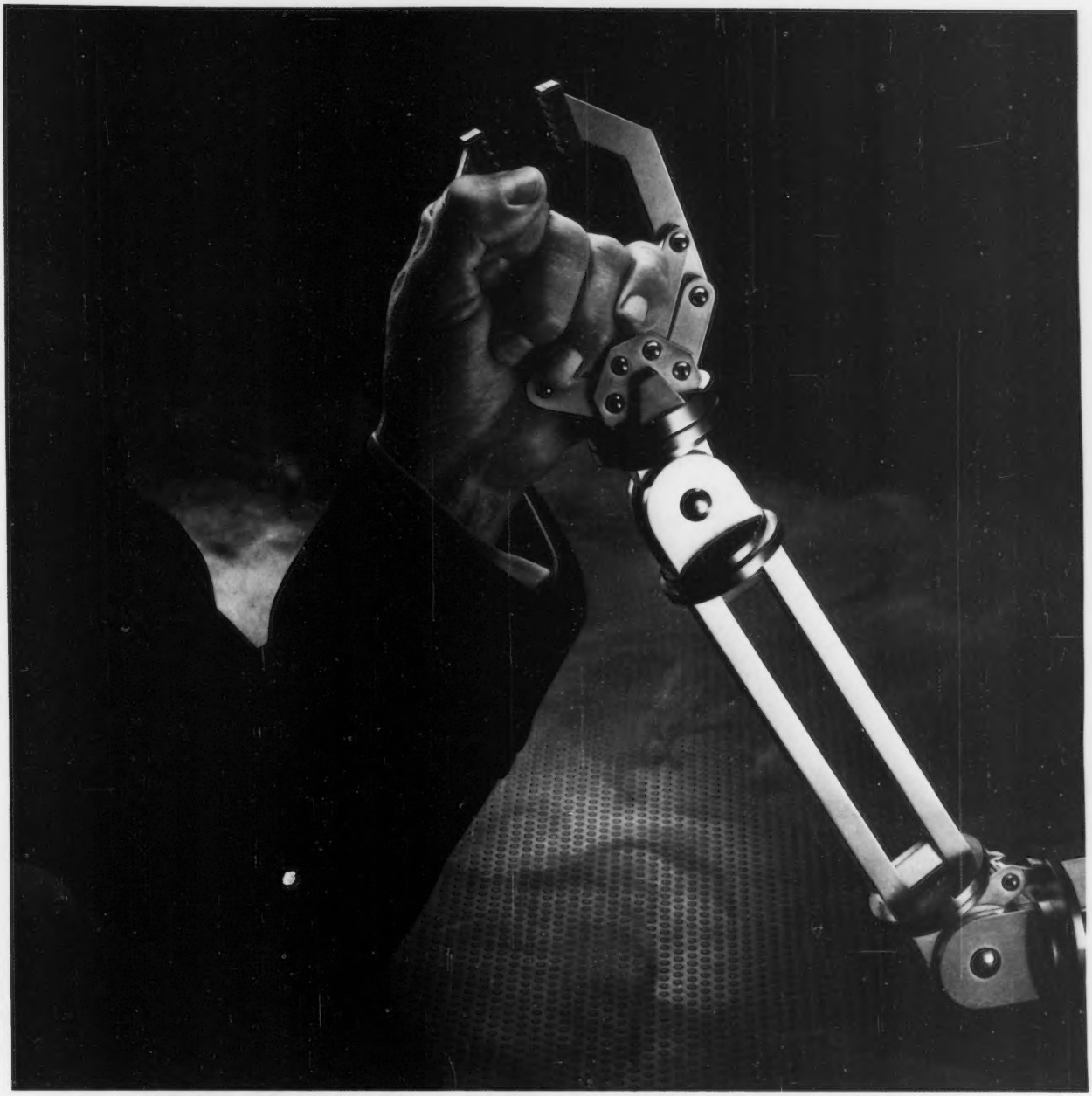
SQ Software has announced **Release 3.1** of its **Structured Query Report Writer** (SQR) for Oracle Corp.'s Oracle relational data base.

SQR is said to combine SQL query definition with print control, formatting and procedural logic into a single, structured paragraph. It also supports full-screen document editing, page headings and footings and input and display commands for interactive query modification.

Features of Release 3.1 include the ability to read and write external files, define multidimensioned arrays, pass report arguments at runtime and include common source modules.

SQR is priced from $295 to $10,500.

SQ Software, 2000 Lee Road, Cleveland, Ohio 44118.



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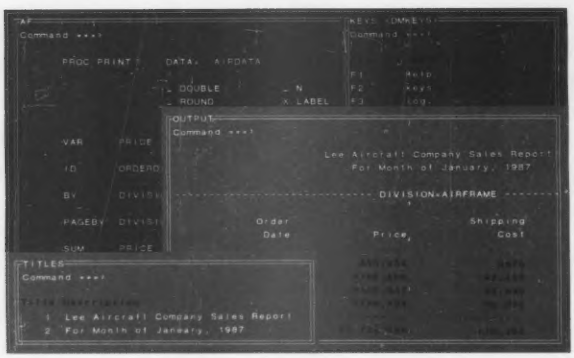
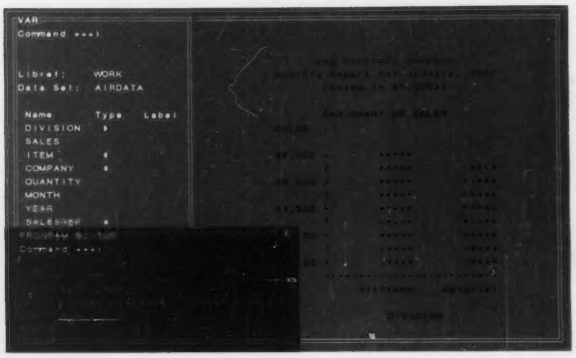


2 Connectivity. With the SAS System for personal computers, you get a built-in link to your host SAS System. You can download corporate data; develop, test, and run applications on your PC; or move data and applications back to the host for execution. Plus the SAS System reads data from any kind of file, including dBASEII,® dBASEIII,® and Lotus® 1-2-3.®

3 Integration. The SAS System runs on mainframes, minicomputers, and personal computers. The language and the syntax are the same. The full-screen text editor is the same. You only have to learn one software system no matter what hardware your company has installed.



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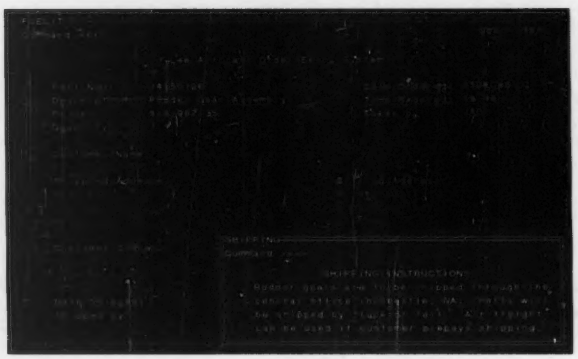

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MICROCOMPUTING

SMALL TALK

William Zachmann

Printer's come a long way

In the summer of 1983 I bought an IBM Personal Computer with my own money. I already had one in my office at International Data Corp. (IDC) that had been paid for by the company.

I knew I couldn't get IDC to pay for a home computer for me, but I also knew that I could get a lot more work done if I had one in my office at home. So I dipped deep into my savings account and paid $5,244.70 of my hard-earned money for an IBM PC with a color monitor, 320K bytes of random-access memory, word processing software and a printer.

My local computer store didn't have my first choice of a printer, so they loaned me another, less expensive printer to use until they got a shipment of the one I really wanted. I took home my brand new system with a Gemini 10X printer from Star Micronics, Inc.

I never did get the printer I'd orignially ordered. By the time it came in three weeks later, I was so pleased with the loaner that I

Continued on page 36

SQL makes its mark in PC arena

BY RICHARD FINKELSTEIN
SPECIAL TO CW

Structured Query Language (SQL) has arrived on the personal computer, and we are already beginning to feel its impact.

In fact, many major corporations and government agencies contacted by *Computerworld* are standardizing on SQL within their data processing and end-user organizations right down to the microcomputer level — and for good reason.

SQL is a powerful but terse data base language that is meant to be used by applications developers, end users and management personnel. SQL's strength lies in its strong theoretical underpinnings. Unlike its predecessors, SQL was designed with a mathematical foundation, which gives it stability, predictability and usability.

Though E. F. Codd, president of The Relational Institute in San Jose, Calif., believes IBM could have done a much better job developing SQL, the language is still a major step in the right direction. "There are problems with SQL, but it is far superior to other languages. With SQL, you can do set processing, which is much better than the row-at-a-time processing required by Codasyl [network] or hierarchical data bases," Codd says. Set processing requires fewer steps to retrieve specific information from a data base.

It is also important to note that with SQL and the SQL catalog structure, an organization is guaranteed to have a data base management system that meets seven of Codd's 12 rules for relational data bases — with the capability of eventually meeting all 12 rules — and can therefore be considered a true relational data base. These rules define the criteria a data base must meet to be considered fully relational.

Fabian Pascal, management information specialist for the district government of Washington, D.C., recognizes the benefits of

Continued on page 32

Clones a deal for colleges

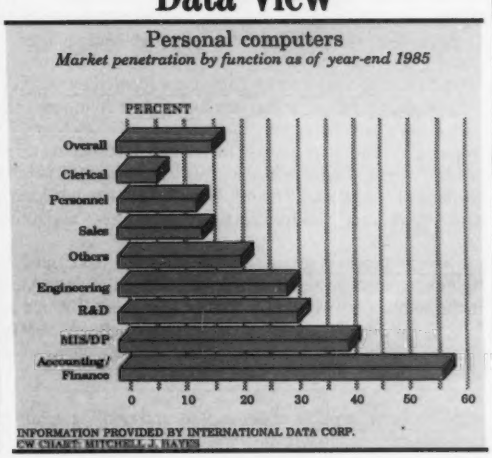
BY JAMES A. MARTIN
CW STAFF

PHOENIX — In an effort to obtain more for its money, the Maricopa Community College consortium recently invested $453,000 in some low-cost, build-your-own IBM Personal Computer clones, saving more than half the cost of buying name-brand microcomputers.

"To buy that many micros from traditional vendors would have cost us about $1.4 million, so we chose to buy the components and assemble them ourselves," says Larry Christiansen, dean of administrative

Continued on page 36

Data View



Package taps extra memory

BY DAVID BRIGHT
CW STAFF

SANTA MONICA, Calif. — A memory management software package that helps Intel Corp. 80386-based personal computers address up to 16M bytes of expanded random-access memory (RAM) was recently announced by Quarterdeck Office Systems.

Called Quarterdeck Expanded Memory Manager-386 (QEMM), the $59.95 product reportedly allows Microsoft Corp. MS-DOS-based applications software that supports the Lotus/Intel/Microsoft Expanded Memory Specification (EMS) to access either extended or EMS memory in a system. EMS is a scheme for bypassing the 640K-byte RAM limit imposed by the MS-DOS operating system.

Quarterdeck officials said QEMM's ability to treat extended memory as EMS memory allows the user add memory to an 80386-based system without worrying about whether it is

Continued on page 32

Inside

SQL

FROM PAGE 31

languages based on Codd's relational model. "The advantages provided by relational technology are generic and intentionally so. As a theory-based, unified approach to data base management, it aims at simplification to increase user productivity and flexibility to handle change.

Thus, using a terse, simple, nonprocedural language like SQL benefits the micro user no less than the mainframe/mini user. He writes less procedural code, memorizes less syntax and does not need tedious menus and prompts to take advantage of the systems automatic optimization and multiple records-at-a-time processing," Pascal says.

"If there is one thing the data processing community has learned," says Ken Cohen, director of marketing for Oracle Corp., "is that standards are important."

'Strategic decision'

These sentiments are echoed by Richard Porter, director of management information services for Nestle Enterprises Ltd. Canada. "We have made a strategic decision to go with SQL based upon compatibility and portability," he says.

Another company standardizing on SQL is Amoco Corp. Howard Fosdick, senior data base administrator for Amoco, explains, "We started using SQL early on our large IBM MVS and VM machines. We felt, in order to keep training costs down and promote portability of programs across different machines, we should standardize on SQL."

Standardization also increases the ability of end users to communicate with professional data processing personnel.

Robert Osacky, manager of data base administration at Commonwealth Edison Co., says he feels that "users who work with SQL on PCs are able to more effectively communicate with the DP staff."

Standardization also translates into productivity. Osacky, who managed the implementation of IBM's DB2 on the main-

Continued on page 37

Package

FROM PAGE 31

EMS or extended memory.

According to Gary Pope, Quarterdeck executive vice-president, extended memory is defined as any amount over 1M byte. Extended memory does not require the extra mapping circuitry of EMS and is typically faster, he said.

QEMM is similar to the expanded memory manager in Compaq Computer Corp.'s Deskpro 386 system, Pope said.

"QEMM provides to the rest of the world what Compaq provides with its memory manager," he added.

QEMM can reportedly be used with 80386-based systems, as well as with accelerator boards that are based on the 80386. While QEMM complements Quarterdeck's Desqview multitasking environment, Desqview is not required.

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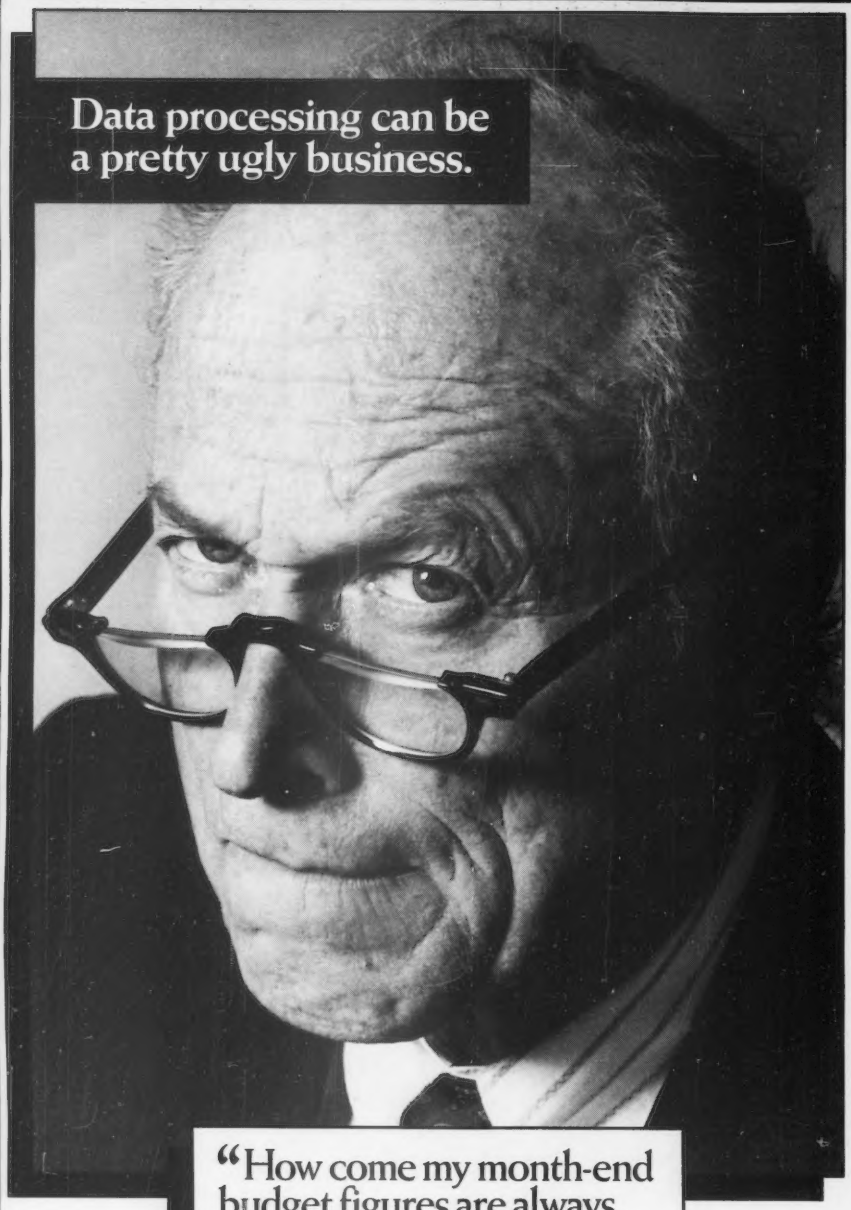

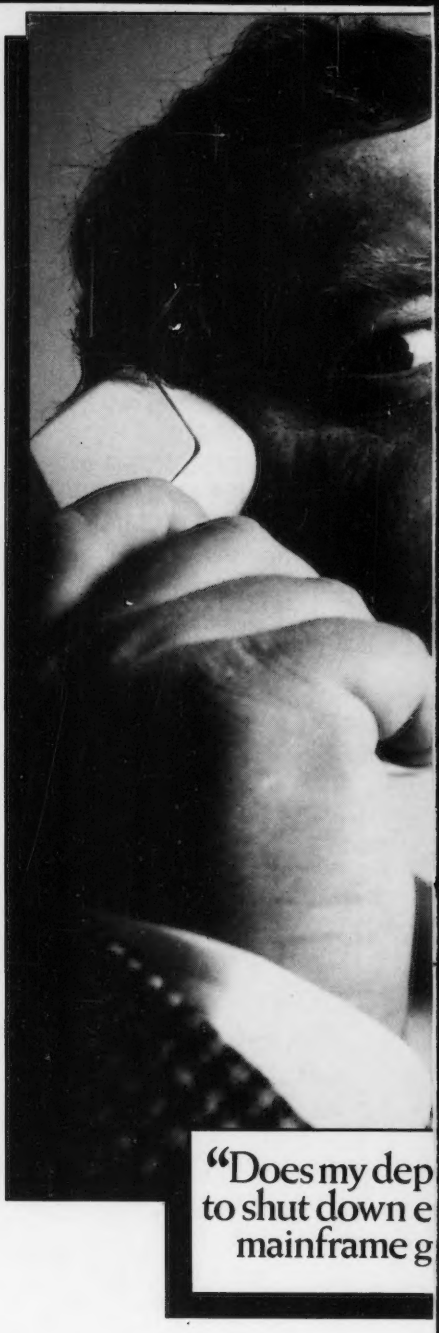

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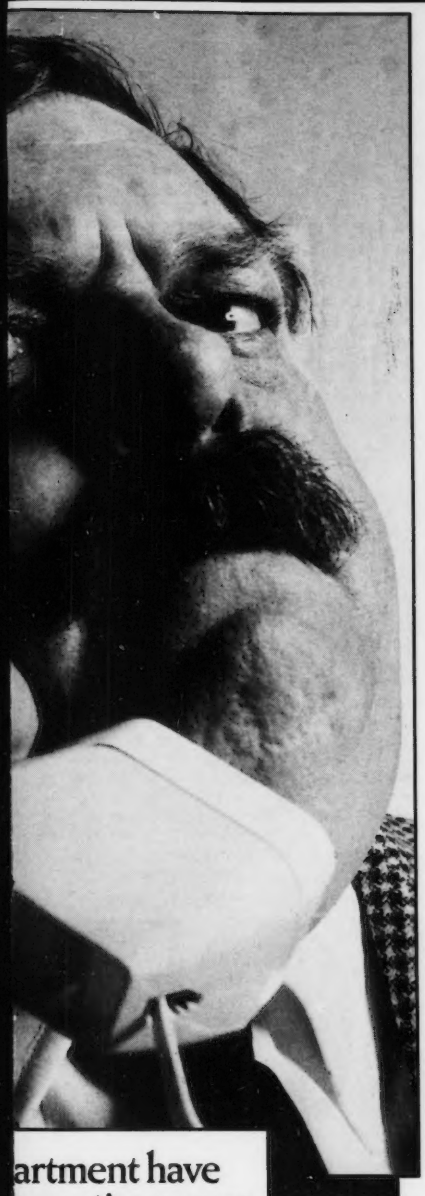

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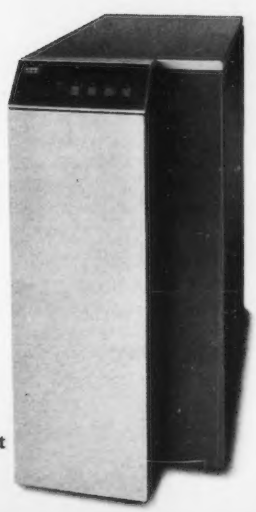

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ITT
COURIER

Printer

FROM PAGE 31

kept it, applying the $162.75 price difference toward a 300 bit/sec. Hayes Microcomputer Products, Inc. modem instead. The Gemini 10X did everything I needed just as well as my original choice.

I was also impressed with its simple but rugged construction, removable (and replaceable) print head and the fact that it used simple, inexpensive Underwood typewriter ribbons instead of the special ribbon cartridges most other printers required. In fact, I've still got the old Gemini 10X and use it as a backup printer.

The Star Micronics NB-15 24-pin, letter-quality dot matrix printer introduced last summer shows that the company has come a long way from simply being a relatively unknown source of lower cost printers. The NB-15 is about as state of the art as wire dot matrix printers get.

List priced at $1,449, but typically available from dealers for quite a bit less, the NB-15 offers a host of features that make it an attractive product for anyone who wants just about everything a dot matrix printer has to offer. It produces solid 24-pin letter-quality output at 100 char./sec. and blazes along at 300 char./sec. in draft mode.

The NB-15 has the same straightforward, solid, reliable construction of my Gemini 10X, although it does require a special ribbon cartridge. Clearly engineered for durability and serviceability, it looks just as likely to keep on working year after year as my old 10X has done.

Removable font cartridges priced at $59.95 each offer Prestige Italic, Letter Gothic, Courier, Courier Italic and Orator fonts in addition to the Prestige font that is built-in. Two cartridges at a time can be mounted in slots on the front panel of the printer. It comes with a 16K-byte, built-in print buffer that can be optionally expanded to 32K bytes.

The Star NB-15 can operate in a mode fully compatible with the IBM Graphic Printer and also the Epson America, Inc. LQ1500. The built-in tractor feed easily handles fanfold paper from 4 to 15.5 in. Micro adjustable spacing provides precise forms alignment as well as high-resolution graphics capabilities.

Special characters can be created and downloaded to the printer with appropriate software, in addition to using the read-only memory character font cartridges. Double and quad oversize characters can also be printed. Ten international character sets as well as the standard U.S. character set can be selected.

Best of all, the Star NB-15 puts a wide range of controls conveniently on the front panel. Form length, type style, mode (draft or letter quality) and print pitch (pica, elite, condensed and proportional spacing) can be directly selected from the panel switches.

Other panel controls include micro feeding for lining up preprinted forms, hardware setting of left and right margins, selection of the IBM graphics printer compatibility mode, a Power On self-test and a hex dump facility that can be helpful in program debugging.

The front-panel control for these features makes it easy to use them even when using software without printer drivers written for the NB-15.

The Star Micronics NB-15 is a first-rate printer that will stand up well against competitive offerings from better known vendors.

Zachmann is vice-president of research at International Data Corp.

Clones

FROM PAGE 31

services at Glendale Community College, one of the seven colleges in the consortium.

After considering their hardware options, college administrators decided they could inexpensively expand the consortium's computer-literacy program with PC clones. Taking that one step further, the staff at Glendale Community College saw the possibility of additional savings by building the clones themselves.

"It would have cost us about $20 a unit to build the PCs ourselves," Christiansen says. "But we got a bid to assemble them for $7 a unit, so naturally we went with that."

All but 12 of the some 600 micros are PC XT clones with 256K bytes of random-access memory, dual disk drives and monochrome monitors. The rest are PC AT look-alikes with 20M-byte hard disks and color monitors. Rycom Corp., a microcomputer parts supplier in Phoenix, performed the actual assembly of the micros, although MIS support staff at the colleges built several as well.

"The size of this job was quite unusual," says Michael Shumaker, Rycom president. "It was the first time we had assembled that many micros for anyone." Shumaker says low-cost PC clones are becoming more of a viable alternative as prices drop and technology improves. "It's simply a matter of economics," he adds.

Glendale received the bulk of the micros — about 330 — with the remaining dispersed among the other colleges. When the micros arrived on campus, technical staff at each of the colleges performed first-line troubleshooting.

The failure rate for the clones has been about 10%, according to Christiansen, who says that figure is average. End-user support is offered by the technical staff at each campus and from the central repair site of 65 programmers, technicians and other support staff.

The PC XT and AT clone solution provided more in savings than just dollars. "Part of this entire process was an education for our computer staff," Christiansen says. "As a result of dealing with these machines on a component level, they became much more knowledgeable about the inner workings of the system. It was an on-the-job training opportunity to bring our technical staff up to speed on these units."

Use of SQL

CONTINUED FROM PAGE 32

frame and has introduced SQL to his PC users, argues that implementing SQL on micros and minicomputers has a twofold effect on productivity.

"SQL on the micro can be used as a training tool. Users understand the mainframe system better after working with the micro version," Osacky explains, adding that he plans to extend the use of SQL on the micro by using it as a prototyping tool for mainframe applications systems.

Pascal agrees that prototyping and developing mainframe systems on the micro is the trend. "With similar DBMS/SQL implementations on the micros, most of the development effort will be off-loaded to micros where each programmer can write, test and debug applications without affecting or being affected by other users," he says.

Tony DeMeo, data processing manager for the Village of Northbrook, Ill., is using Oracle products to support all municipal operations. "End users do their own ad hoc queries and reporting using Oracle's SQL. SQL is also used for all application development," DeMeo says. "Everything we do is based upon SQL."

DeMeo says he feels that, because of SQL, end users can now do work formerly requiring data processing professionals. His technical staff now has more time to work on solving more difficult problems.

Tony Schaller, manager of systems development with Carnegie-Mellon University, is managing a long-term strategy to connect 6,000 to 8,000 PC workstations with the university's mainframe computers. Central to this strategy are Ingres, a line of products from Relational Technology, Inc., and SQL.

'Must be portable'

"People will not spend the time to learn a language unless it is portable. With SQL, users are trained only once, and then they are able to access information from any one of the university's data bases," Schaller explains. .

Nestle Enterprises is also pursuing a distributed data base approach. Porter's intention is to have Ingres running on all Digital Equipment Corp. VAX minicomputers by the end of this year. Concurrent with this effort, Porter plans to begin off-loading applications to PC Ingres and downloading mainframe data to the personal computers using the Ingres Link product.

SQL is a growing language. New tools that enhance its capabilities are being brought to the market almost daily, with increased usability as a major area of concern. "The main weakness of today's SQL DBMSs are their end-user facilities," Porter says. "We expect to take advantage of third-party software, especially in the areas of graphics and natural-language query front ends." Oracle has already integrated several end-user tools to enhance the spreadsheet and graphics capabilities of the Oracle DBMS.

SQL as link standard

One of the primary areas of research is artificial intelligence and expert systems. Arity Corp. recently introduced a product that integrates SQL and Prolog into one system. Peter Gabel, president of Arity, states that "SQL has emerged as the standard for cooperative management between micros and mainframes. Arity recognizes the importance of combining automated expertise with traditional data base processing."

Suzanne Mamet, assistant director of data administration at Travelers Insurance Co., is exploring the use of expert systems in support of data base design.

Mamet's project captures data used for data modeling and stores it in relational data bases. "Because much of our current design work involves relational technology, we have opted for a version of Prolog that contains an SQL development package that is highly compatible with IBM's SQL," Mamet says.

ANSI standard inadequate

While the use of SQL continues to grow, the American National Standards Institute's (ANSI) proposed SQL standard is inadequate in defining the language. Sharon Weinberg, president of Codd & Date Consulting in San Jose, Calif., is disappointed with the committee's proposal. "They chose the least common denominator of all the implementations," she says.

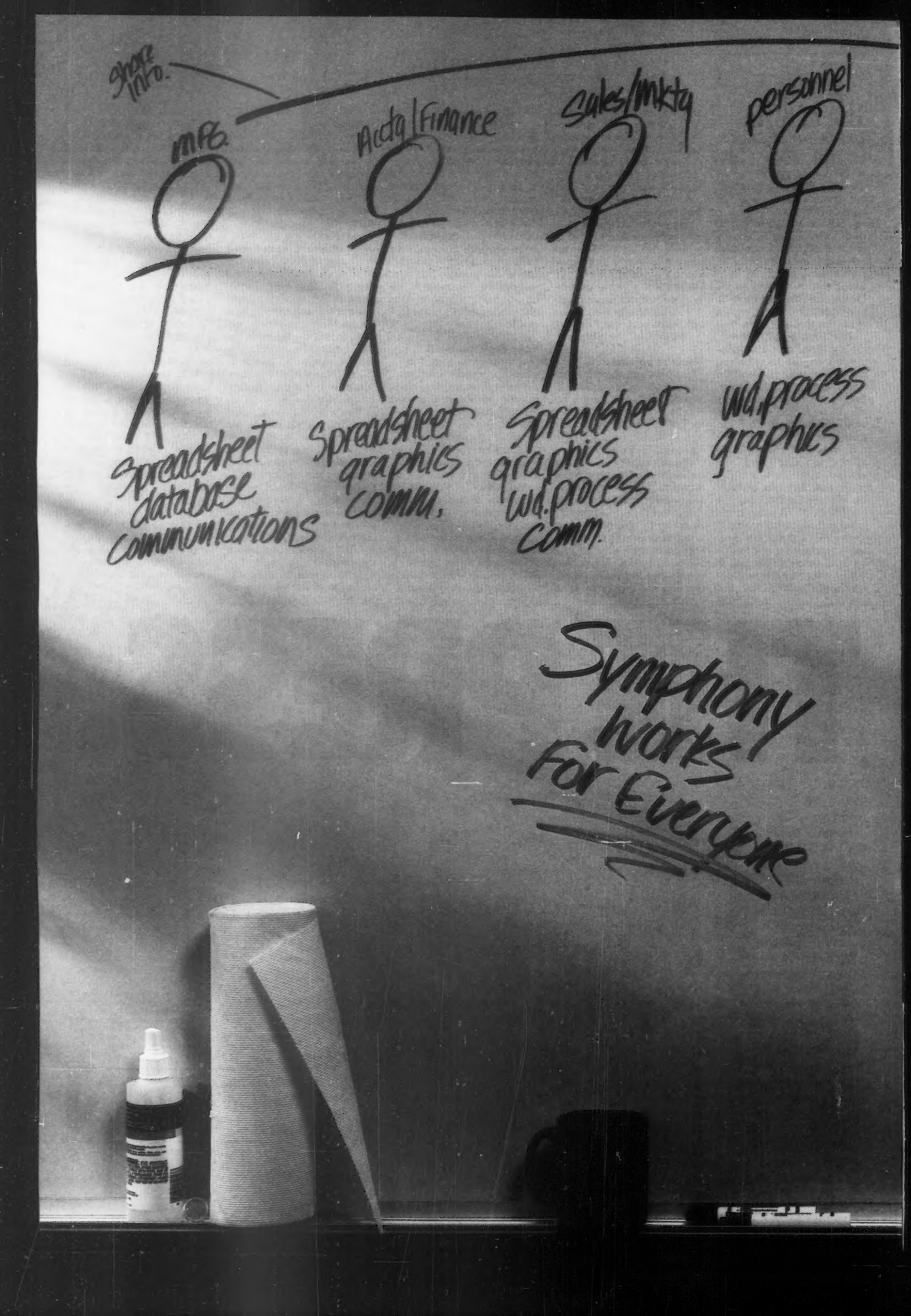
Weinberg points to the lack of a standardized SQL catalog as a major deficiency. When working with different SQL products, one also notices that vendors tend to implement different data definition commands, expand the language, deviate in how a particular command executes and provide vastly different applications development tools. ANSI and IBM provide no real help in these areas.

Codd says he believes that vendors must also move toward full support of his relational model. This includes support for primary and foreign keys as well as domains. Currently, the SQL data definition language does not address any of these issues.

As a result, implementations of SQL, both on mainframes and micros, cause unnecessary data integrity problems that applications developers are forced to deal with on an application-by-application basis. Of course, when the relational model is fully implemented, users will have to absorb additional costs to convert their systems in order to take advantage of the DBMS's new capabilities.

Since SQL is still in its infancy, there are sure to be many more breakthroughs that will enhance the capabilities of the language. By choosing SQL now, you will not only have a language that can increase application productivity and usability today but will also position your organization to take full advantage of the technological advances of the future.

Finkelstein lectures for the Relational Institute and consults for Codd & Date Consulting. His company, Performance Computing, Inc., located in Chicago, specializes in SQL data base management and publishes the "SQL Review" newsletter.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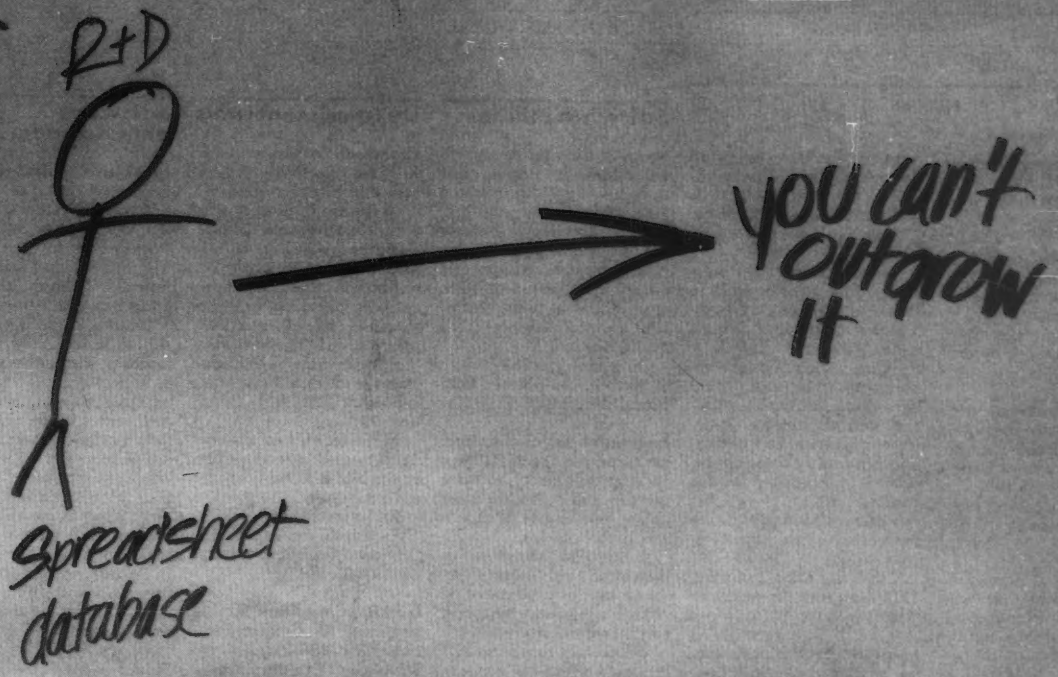

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NEW PRODUCTS

Software applications packages

Walonick Associates has enhanced its **Statpac Gold** statistical analysis software with a forecasting module.

The module provides exploratory data analysis, time-series forecasting and quality control analysis.

The Statpac Gold base package contains three regression modeling techniques. The module adds 11 forecasting methods.

Statpac Gold costs $595. The forecasting module costs $195.

Walonick Associates, 6500 Nicollet Ave. S., Minneapolis, Minn. 55423.

Felsina Software has announced **A-Talk Plus**, a terminal program designed for the Commodore Business Machines, Inc. Amiga that supports Tektronix, Inc.'s 4010/4014 graphics emulation.

A-Talk Plus is said to support the standard Alpha, Graph and Graphic Input modes and two enhanced graphics modes.

Vector line formats include solid, dotted, short-dashed, long-dashed and dot-dashed lines.

In addition to Tektronix graphics emulation, A-Talk Plus includes communication tools, as well as a multitasking spooler, capture buffer, a custom voice option and support for more than 10 modem types.

A-Talk Plus is priced at $99.95.

Felsina Software, Suite 275, 3175 S. Hoover St., Los Angeles, Calif. 90007.

Corporate Class Software Inc. has introduced **Fastar**, a financial reporting and analysis software package for use on the IBM Personal Computer or compatibles.

Fastar is said to collect, organize, manage and consolidate financial data. The product also allows for international planning and analysis.

It can perform financial reporting functions such as currency conversions; journal entries and hierarchy roll-ups. It includes audit trails, data verification and password protection capabilities, according to the vendor.

Fastar costs $25,000 for a departmental system supporting up to 25 users.

Corporate Class Software, 1211 Avenue of the Americas, New York, N.Y. 10036.

Software Technology, Inc. has announced **General Ledger System-M**, **Trust Accounting System-M** and **Critical Data System-M** for Novell, Inc. Novell Netware and the IBM PC Network.

All three packages are said to allow up to nine terminals in a network to make entries into the system at the same time. Each system may be used as a stand-alone or integrated with the vendor's Time Accounting and Billing System III-M.

The General Ledger System-M costs $700. Trust Accounting System-M costs $500, and Critical Data System-M is priced at $400.

Software Technology, Suite 120, 620 N. 48th St., Lincoln, Neb. 68504.

Software utilities

Micro-Z Co. has announced **Direc-Link**, a program that transfers files between laptop and desktop computers.

Direct-Link allows users to copy single or multiple files between computers via serial ports using a point-and-shoot technique. According to the vendor, files are sent at more than 10,000 char./sec.

Direc-Link costs $59.

Micro-Z, #4 Santa Bella Road, Rolling Hills, Calif. 90274.

Interactive Solutions, Inc. has announced **Acacia/OPM**, a personal computer software package said to measure response time exactly as experienced by the end user.

Acacia/OPM measures by transaction and reports response time as experienced by end users. It includes the sum of host and network response time.

The package runs on an IBM Personal Computer or compatible that simulates an IBM 3278 or 3279 using a Digital Communications Associates, Inc. Irma or compatible emulation board. It supports any application that uses standard 3270 terminals such as CICS, TSO, IMS, VM/CMS, ISPF and ICCF.

Acacia/OPM costs $1,995.

Interactive Solutions, 53 W. Fort Lee Road, Bogota, N.J. 07603.

Insight Development Corp. has announced **Laserplotter**, a software utility said to provide Hewlett-Packard Co. HP 7470A plotter emulation for the HP Laserjet line of printers.

Laserplotter allows IBM Personal Computer software to take advantage of the 90,000 dot/in. resolution offered by Laserjet printers. It features pop-up menus and the ability to map any pattern to any pen color.

Insight also announced Jetwriter, said to provide IBM Displaywriter users with full-featured printing on HP's Quietjet printers.

Laserplotter is priced at $150. Jetwriter costs $49.

Insight Development, Suite 140, 1024 Country Club Drive, Moraga, Calif. 94556.

Quadram Corp. has introduced a Lotus Development Corp. 1-2-3 **software driver** for its Quad-EGA Prosync graphics board.

The Prosync board supports the advanced display capabilities of variable scan monitors. The driver provides users of 1-2-3 Version 1A with a 120-col. by 25-line display, according to the vendor. Users of Version 2.0 have the additional option of a 120-col by 43-line format.

The 1-2-3 driver will be shipped with all Prosync boards. Prosync costs $595.

Quadram, One Quad Way, Norcross, Ga. 30093.

Development tools

Expertech Ltd. has announced **Xi Plus**, a personal computer-based expert system shell.

Xi Plus is a rule-based expert system said to provide the application generating capabilities of a dedicated artificial intelligence workstation. The product has extended inferencing as well as interfaces for external files, graphics and telecommunications. It also features an English language interface for creating knowledge bases and applications.

Xi Plus requires a minimum of 512K bytes of memory. It runs on the IBM Personal Computer and compatibles.

Xi Plus costs $1,250.

Expertech, Suite 204, 650 Bair Island Road, Redwood City, Calif. 94063.

Gold Hill Computers, Inc. has announced its **Golden Common LISP 386** (GCLisp 386) **Developer** for the Compaq Computer Corp. Deskpro 386.

The GCLisp 386 Developer is said to provide a Common LISP programming environment for building expert systems and other artificial intelligence applications. These AI applications include natural-language interfaces to Ashton-Tate's Dbase and Lotus Development Corp.'s 1-2-3.

The GCLisp 386 Developer is also said to be able to integrate C programs with artificial intelligence applications.

It supports a large memory interpreter and compiler, on-line Help system and an enhanced editor with more than 150 commands, according to the vendor.

The 386 Developer costs $1,195. A complete Deskpro 386 system is priced from $7,800 to $16,400.

Gold Hill Computers, 163 Harvard St., Cambridge, Mass. 02139.

Software enhancements

Innovative Software, Inc. has announced **The Smart Software System Version 3.1** as well as the Smart Word Processor with Spellchecker, The Smart Spreadsheet with Business Graphics and The Smart Data Base Manager.

Smart Software System 3.1 is said to feature network-ready capability, allowing the program to be used as either a single- or multiuser package. Multiuser capabilities include file and record locking in the data base manager and file locking in the word processor and spreadsheet. In addition, Smart's password protection schemes provide data integrity for all users of the network environment.

Prices for the packages range from $395 for the Word Processor to $895 for the Smart Software System.

Innovative Software, 9875 Widmer Road, Lenexa, Kan. 66215.

Printers/Plotters/Peripherals

General Parametrics Corp. has introduced the **Printmaker 20C** and **Printmaker 20X** desktop printing products designed to provide transparencies and hard copy in full color with thermal and ink-jet printers.

Printmaker 20C produces 1,000-color output in both landscape and portrait forms.

The product is said to include the California Computer Products, Inc. 5902G thermal printer.

Printmaker 20X allows users to produce 1,000-color output with the Xerox Corp. 4020 color ink-jet printer. It offers a color-density mode for color transparencies and a high-resolution mode for hard copy and a draft

Continued on page 42

Turn batch COBOL programmers into on-line programmers in 1 day.

With COBOL/XE *all* your batch COBOL programmers can now develop CICS, CMS, and TSO applications...without tedious on-line coding and without learning complicated, new coding techniques. Put their skills to work now to help you cut your backlog of on-line applications...and do it faster and more efficiently than ever before.

Familiar, Natural Coding. COBOL/XE reduces training costs by extending the familiar set of batch COBOL commands to the on-line environment. Now, programmers can develop on-line programs simply and naturally, using easily learned extensions of ANSI COBOL.

Eliminate BMS Mapping. Using COBOL/XE's interactive screen PAINTing facility, anyone can quickly and easily design screen layouts on a 3270 or PC/370 screen without writing a single line of code. New screens can handle any attribute an application may require, completely eliminating the need for complex BMS code.

Portability of Code. On-line applications can be developed and tested with COBOL/XE in any environment and executed in any one of them without being changed or recompiled. Develop applications in one environment and execute them in another with no extra coding.

Reduce Debugging and Maintenance. The COBOL/XE debugger provides real-time tracing, testing, and verifying of a COBOL/X program's logic, saving the time and expense of trial-and-error testing. By specifying various break conditions, you can dynamically control the execution of any COBOL/XE program.

Without COBOL/XE. *A pseudo-conversational task coded in Command-Level COBOL.*

```
PROCEDURE DIVISION.
*
000-SWITCH-SECTION.
*
    MOVE DFHCOMMAREA TO NEXT-TASK.
    IF NEXT-TASK='S' PERFORM 100-SEND-SCREEN.
    IF NEXT-TASK='R' PERFORM 200-RECEIVE-SCREEN.
*
    .
    .
    .
*
100-SEND-SCREEN.
    EXEC CICS HANDLE CONDITION MAPFAIL(MENU)
        ERRORS(ERRORS) END-EXEC.
    MOVE 'R' TO NEXT-TASK.
```

```
    EXEC CICS WRITE TSQ FROM(CAR-REC)
        RIDFIELD(CAR-ID) END-EXEC.
    EXEC CICS SEND MAP('CAR-PNL')
        MAPSET('PRODSET') END-EXEC.
    EXEC CICS RETURN TRANSID('CAR1')
        COMMAREA(NEXT-TASK) LENGTH(1) END-EXEC.
*
200-RECEIVE-SCREEN.
*
    EXEC CICS HANDLE AID ANYKEY(300-MAIN-LOGIC)
        END-EXEC.
    EXEC CICS RECEIVE MAP('CAR-PNL') MAPSET('PRODSET')
        INTO(KEY-MAP) END-EXEC.
```

With COBOL/XE. *A pseudo-conversational task coded in COBOL/XE. COBOL/XE automatically performs the functions necessary for pseudo-conversational CICS execution simply by using the verbs DISPLAY and ACCEPT. Complex CICS code is unnecessary, and efficient execution is ensured.*

```
DISPLAY CAR-PNL.
ACCEPT CAR-PNL.
```

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800-642-0177

On-Line Software International
Authorities in IBM Software

COBOL/XE. *The On-line Applications Development System for the Batch Programmer.*

Continued from page 40

mode for faster printing of graphics.

Printmaker 20C is priced at $5,595. Printmaker 20X costs $1,960.

General Parametrics, 1250 Ninth St., Berkeley, Calif. 94710.

Dataproducts Corp. has announced the **8070 Plus** dot matrix printer.

The IBM Personal Computer-compatible printer is said to be capable of multicolor, high-resolution graphics. It comes with both serial and parallel interfaces and a universal power supply. It includes eight standard character sets, such as a bold sans serif Courier font. Optional character sets include a choice of bar codes.

Tractor, friction and semiautomatic single-sheet feed are standard, and the optional fully automatic single-sheet feeder holds up to 250 sheets of paper.

The 8070 Plus is priced at $2,099.

Dataproducts, 6200 Canoga Ave., Woodland Hills, Calif. 91365.

Board-level devices

Matrox Electronic Systems Ltd. has introduced a two-board set for the IBM Personal Computer AT, called the **MVP-AT**, that combines true-color frame grab and high-resolution graphics with real-time image processing techniques.

The MVP-AT supports convolutions, frame averaging, histograms, erosion and dilation, profiles, addition, subtraction and nonlinear transformation, according to the vendor.

Other features include support for noninterlaced, flicker-free display, overlay memory and an enhanced graphics adapter switch.

The MVP-AT is priced at $8,995 with an add-on processor module.

Matrox Electronic Systems, 1055 St. Regis Blvd., Dorval, Quebec, Canada H9P 2T4.

PGX, Inc. has dropped the price of its **HR-1200** series of color graphics boards.

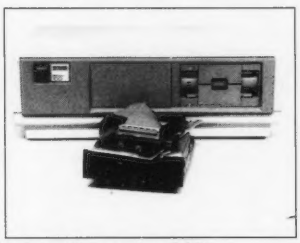
The IBM Personal Computer-compatible add-in cards occupy a single card slot and provide flicker-free graphics on 60-Hz, noninterlaced monitors. They offer resolutions of 1,280 by 1,024 pixels in either 8-bit, 256-color or 4-bit, 16-color versions. The family also includes two 1,024- by 768-pixel boards.

Prices now range from $1,795 to $2,995.

PGX, 3730 Skypark Drive, Torrance, Calif. 90505.

Rohrer Electronics & Consulting has announced **RB20**, an upgrade kit for the Digital Equipment Corp. Rainbow personal computer.

The RB20 allows users to upgrade the Rainbow with a 21M-byte Winchester



Rohrer Electronics' *RB20*

disk, a parallel printer port and a real-time clock. Software drivers, diagnostics and formatting routines are included in the package.

The RB20 is priced at $1,440.

Rohrer Electronics & Consulting, L'Haut Bozon, CH-1801 Mt. Pelerin, Switzerland.

General Parametrics Corp. has announced the **Colormetric 20** color graphics card for IBM Personal Computers, PC XTs, ATs and compatibles.

The Colormetric 20 is said to turn the computer into a full-capability graphics workstation.

Users can view images in 1,000 colors, exactly as they will appear as transparencies, hard copy or slides. The card is compatible with such PC graphics packages as Lotus Development Corp.'s Freelance Plus, Microsoft Corp.'s Chart and Chart-Master from Ashton-Tate.

The Colormetric 20 card is priced at $1,875. A Colormetric Videocable is included to allow use with standard enhanced graphics adapter and color graphics adapter cards, according to the vendor.

General Parametrics, 1250 Ninth St., Berkeley, Calif. 94710.

PC Technologies, Inc. has introduced the **286 Ramracer**, which is an accelerator board, and the **Rampartner**, which the vendor said is a Lotus/Intel/Microsoft Expanded Memory Specification (EMS) or Enhanced EMS board.

The 286 Ramracer is a single-slot, 8-MHz accelerator with up to 2M bytes of Enhanced EMS or EMS memory, according to the vendor. Rampartner is a 2M-byte memory board that can be used in conjunction with the 286 Ramracer to provide up to 4M bytes of memory, the vendor said.

The product can be used independently, according to the vendor.

Designed for the IBM Personal Computer, the 286 Ramracer costs $745 with no random-access memory (RAM) and $1,225 with 1.5M bytes of RAM.

A daughterboard costs $150 with 512K bytes of RAM.

The Rampartner costs $360 with no RAM and $960 with 2M bytes of RAM.

PC Technologies, Box 2090, 704 Airport Blvd., Ann Arbor, Mich. 48106.

NETWORKING

DATA STREAM

Christine Gianone and Frank da Cruz

Kermit leaps in popularity

At the foundation of many communications programs and systems installed in business and academic environments is a widely used but largely unsung program named Kermit, after the puppet frog of the same name (used with permission of Henson Associates, Inc.).

The program is designed to solve the classic problem faced by large organizations with extensive multivendor environments.

Forced to tie together a hodgepodge of equipment, including IBM mainframes and Personal Computers, Digital Equipment Corp. and Hewlett-Packard Co. hosts, Apple Computer, Inc. Macintoshes, Unix systems large and small, engineering workstations and so on, communications managers look for — and more often than not fail to find — a networking solution that is both comprehensive and affordable.

Columbia University — a large, decentralized organization with a diverse population of central mainframes, departmental minis and personal computers — confronted just such a problem in 1981. The univer-

Continued on page 46

LAN industry skyrocketing

BY ELISABETH HORWITT
CW STAFF

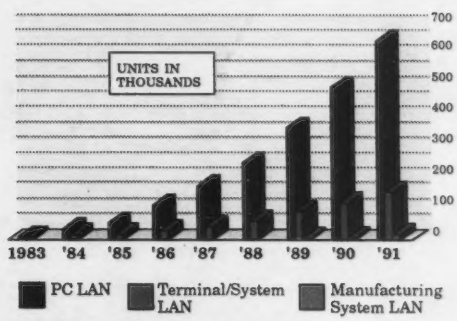
The local-area network (LAN) industry — particularly the manufacturing and IBM Personal Computer network segments — enjoyed significant growth in 1986 that should continue during the next five years, according to the Local-Area Networks report that was published recently by Framingham, Mass., research firm International Data Corp (IDC).

Among the important advances the industry made last year were standardization of networking hardware and media access methods; reduction of interface costs due to lower priced communication servers and the implementation of twisted-pair

Continued on page 46

LAN shipments

PC LANs lead in accelerating network installments



INFORMATION PROVIDED BY INTERNATIONAL DATA CORP.
CW CHART: STAFF

T1 switch product line revved up

BY DAVID BRIGHT
CW STAFF

WASHINGTON, D.C. — Infotron Systems Corp. added two products to the high end of its T1 switch product line at the Communications Network Exposition held here last week.

The NX4600 supports 96 high-speed T1 links per node or up to 4,000 local channels, the company said. Up to 64 Infotron NX nodes can be interconnected within one integrated network. An NX4600 base unit with full redundancy is priced at $20,000.

Designed to serve as a remote node to the NX4600, the NX3000 supports as many as four links and 24 local channels. The price of this smaller compatible node is $10,000.

Both units support AT&T protocols for Pulse Code Modulation voice transmission and a private branch exchange link that is compatible with AT&T's D4 framing protocols. This enables the systems to interface with AT&T services such as Accunet 1.5 and Customer-Controlled Reconfiguration.

Because the new Infostream NX products have flexible link speeds, support all network topologies and are compatible with Infotron's Infostream multiplexers and INX switching systems, they enable the construction of varying network configurations, the company said.

The link speeds supported by the products include 56K, 64K, 256K, 1.544M and 2.048M bit/sec.

Network topologies supported include point-to-point, drop-and-insert, pass-through, ring and full-mesh.

Other features of the network

Continued on page 45

Comten enhances Gateway

BY ELISABETH HORWITT
CW STAFF

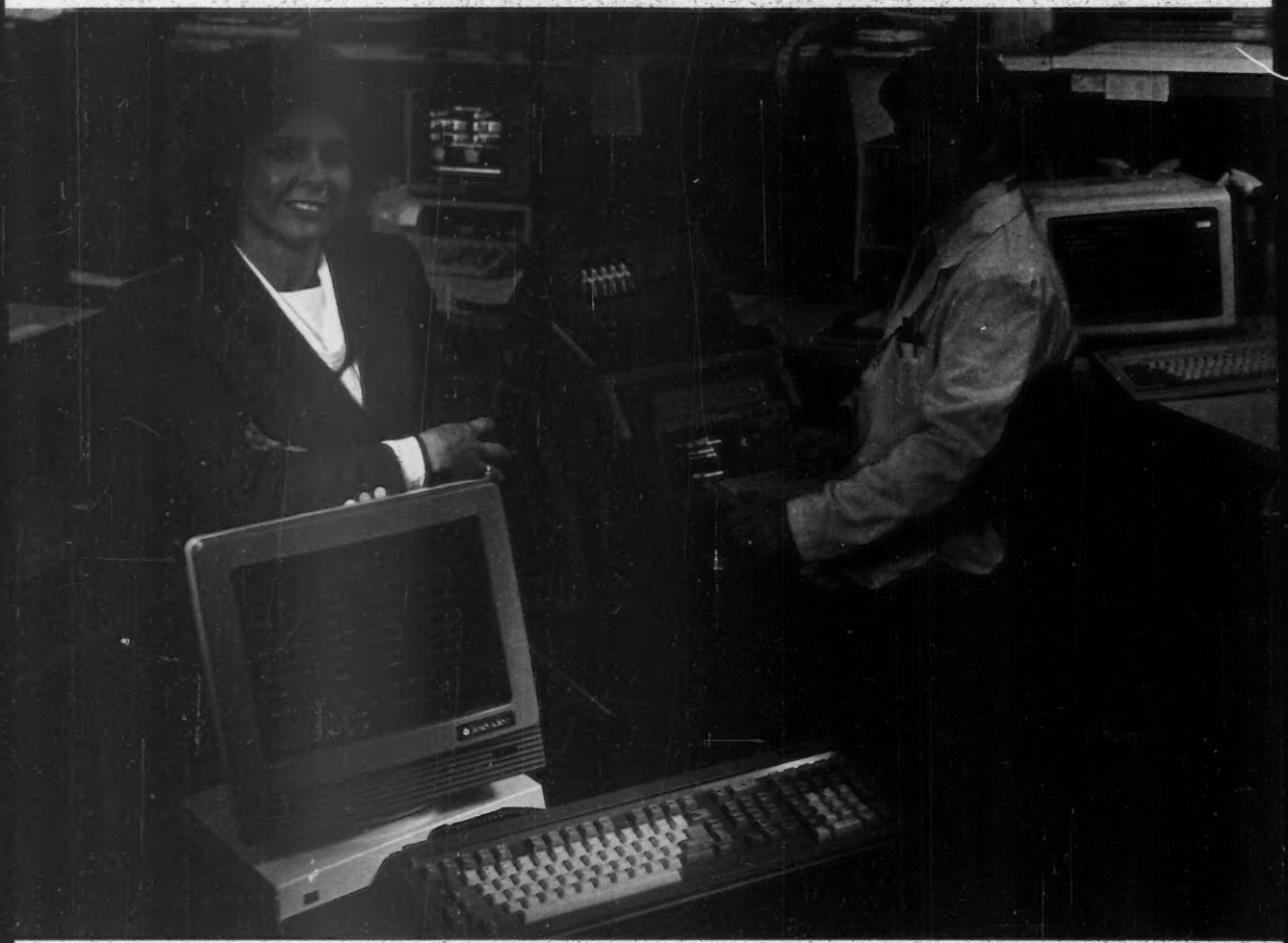
ST. PAUL, Minn. — NCR Comten, Inc. last week unveiled versions of the Comten Network Gateway (CNG) and Comten Advanced Communications Function/Network Control Program (ACF/NCP) with several enhanced features. Among these are support of the latest IBM VTAM and ACF/NCP releases and an extended network addressing capability that IBM also offers.

Available with the latest Version 4.0 of the Comten ACF/NCP, enhanced network addressing increases the address size used on an IBM network from 16 to 23 bits. This, in turn, increases the number of addressable elements within a network subarea from 1,024 to 65,000,

Continued on page 46

Inside

Introducing the most reliable DEC™-compatible terminal ever built. The TeleVideo 9220.



"Why do we want thousands of TeleVideo® terminals? Because we can't afford thousands of problems."

Susan Kennedy should know. She's a product analyst at Leasametric, a company that rents, sells, and services DP equipment all over the country. Including thousands of terminals. And since reliability is crucial to Leasametric, they tear each evaluation unit apart piece by piece. Then, they give it a series of tests that make MIT exams look easy.

"Too many terminals just don't measure up," says Susan. "I've seen machines with questionable ergonomics... keyboards that flex in the middle when you type... even cheap little diodes that could drop off.

"But TeleVideo starts with solid engineering, and follows through with every detail. Overall, they've built the same quality into the 9220 that's made all their other terminals last so long."

And there's more to the 9220 than quality and reliability. There's also an extended feature set, including full VT-220 compatibility. A super-dark 14" amber screen. A tilt and swivel base. 30 programmable function keys. Plus the best thought-out ergonomics around. All for exactly $619.

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DEC and VT-220 are trademarks of Digital Equipment Corporation.

Star topology Ethernet to be developed

BY DONNA RAIMONDI
CW STAFF

Synoptics Communications, Inc. has announced an agreement with AT&T in which it will develop an IEEE 802.3 Ethernet implementation in a star topology running at 10M bit/sec. on AT&T's Premises Distribution System (PDS). Currently, PDS and AT&T's Ethernet-compatible network Starlan, which runs on PDS, support rates of up to 1M bit/sec.

Synoptics, formerly Astra Communications, Inc., will work with AT&T to achieve PDS certification for Synoptics' Latticenet, a star-configured implementation of Ethernet. When this is accomplished, Latticenet will be able to share the same unshielded twisted-pair cable with AT&T networks such as Starlan, according to Andrew Ludwick, president and chief executive officer of Synoptics.

"What is important here is that we are going to move to 10M bit/sec. Ethernet on unshielded voice [twisted-pair wiring] with the AT&T system. We already offer shielded data cable with the IBM system," he said. Latticenet currently runs on the shielded twisted-pair wiring version of IBM's Cabling System wiring and supports a rate of 10M bit/sec.

"We are delighted to have Synoptics among the companies who have endorsed our PDS wiring plan," an AT&T spokesman said. There is no AT&T equity involved in Synoptics' product development effort, however. When the products are ready, AT&T will put them through a rigorous certification process in which it will "try in every way possible to technically break" them, the spokesman said.

The new implementation of Latticenet will support both fiber-optic cable and unshielded twisted-pair wire, which is designed for data as well as voice transmission. Using proprietary technology, the products will allow workstations to reside up to 330 feet from the wiring closet, Synoptics said.

T1 switch

FROM PAGE 43

exchanges are clock transparency and digital bridging. With clock transparency, the user's network can accommodate multiple clocks from varying facilities, such as satellite, private fiber-optic and different carrier-provided links, without clock slippage or information loss.

Digital bridging lets a single front-end processor poll multiple controllers located at different NX nodes. By using the Infostream NX backbone network for the data path, the user can reportedly avoid the expense of multiple analog facilities to the multidropped remote controllers.

Infotron said it plans to support the exchanges with its Integrated Network Manager in the near future and that it is committed to developing IBM Netview/PC support for its NX family.

First 386-based network system bows

ALR provides comprehensive, one-vendor networking system

BY PATRICIA KEEFE
CW STAFF

IRVINE, Calif. — Advanced Logic Research, Inc. (ALR) has introduced what it said it believes is the first Intel Corp. 80386-based network system.

The ALR Network 386 features ALR's Access 386 personal computer as a dedicated file server, ALR's PC2/286 PCs as workstations and Novell, Inc.'s Advanced Netware 286 network software.

"We think that this complete system approach will be well received by dealers and vendors alike. It will be a one-vendor approach where a major manufacturer like ALR will offer all the hardware for a complete system approach," observed Dave Kirkey, ALR's vice-president of sales and marketing.

Corvus Systems, Inc., Compaq Computer Corp. and Convergent Technologies, Inc. have all released 386-based workstations that they are also selling as network file servers.

Network vendors, including Novell and 3Com Corp., are working on a 386 file server solution to bundle with their network software.

The ALR Network 386 systems are available in preconfigured four- and eight-user systems, and additional nodes for up to 255 users can be added.

Complete ALR network 386 system prices begin at $16,995 for a four-user system that includes a 386-based file server, an 80M-byte hard disk drive, a 60M-byte intelligent tape backup, four PC2/286 IBM Personal Computer AT compatibles, five ALR Network 386 Arcnet-compatible network adapter cards, an ALR Network 386-active eight-way hub, connecting cables and installed Advanced Netware.

The ALR Network 386 is available through authorized ALR resellers.

Kermit leaps

FROM PAGE 43

sity solved its problem by developing Kermit, an RS-232-based communication protocol designed to accommodate dissimilar types of computers, operating systems and file systems.

Kermit is especially suited to micro-to-mainframe connections for both IBM and non-IBM systems but works equally well for PC-to-PC or mainframe-to-mainframe connections. Kermit programs provide error-checked transfer of text and, in most cases, binary files through both seven- and eight-bit communications channels.

The only requirements are an asynchronous serial connection (direct or dial-up) and Kermit software running on each machine. Personal computer versions of Kermit, as well as some of the mini and mainframe versions, also feature terminal emulation, usually of the DEC VT52 or VT100.

Because Kermit has always included source code and a protocol specification, it has been relatively easy for users to improve existing Kermit programs, adapt them to new systems or write new Kermit programs. In turn, the results are sent back to Columbia for further distribution and the process continues. There are now Kermit programs for more than 200 different machines and operating systems.

Kermit tips available

Since Kermit is largely enhanced and implemented by in-house programmers and public-spirited volunteers, Kermit programs come without formal support or warranty. However, informal advice or support for Kermit is not hard to find, since the protocols are in wide use in thousands of organizations around the world. Furthermore, Kermit has been added to an increasing number of commercial software packages, dial-up data base services and other products for which formal support is available.

Columbia University has distributed about 6,000 sets of Kermit, approximately 50% to universities and 40% to corporate data centers. Approximately 200 vendors, including financial analysis software vendor SPSS, Inc. and Crosstalk developer Microstuf, Inc. have implemented Kermit in their communications software.

The fact that Columbia retains the copyright to Kermit has prevented vendors from slapping another name on it and selling it at commercial prices — as has happened with public-domain communications software such as Xmodem. The Kermit software is distributed free and unlicensed by Columbia University Center for Computing Activities in New York.

Comten

FROM PAGE 43

according to Comten marketing product manager Michael Becker. The enhanced network addressing feature also permits ACF/NCP 4.0 to handle up to 255 subareas, each of which corresponds to an IBM host or front-end processor.

"The extended addressing, by allowing more network elements per subarea, allows companies to make fuller use of their front-end processors, many of which are underutilized," Becker said.

The Comten ACF/NCP Version 4.0 also incorporates an enhanced version of Comten's Modulo 128 high-speed link. With the enhancement, users reportedly can transmit up to 127 blocks of data over an Synchronous Data Link Control (SDLC) connection between NCP nodes before an acknowledgement must be sent by the receiving node.

The feature is designed to facilitate SDLC communications over satellite-based links, according to Becker.

The Modulo 128 enhancement is functionally compatible with a similar feature that is offered with IBM's ACF/NCP Version 3, according to Comten.

Beats IBM to punch

A third feature offered by ACF/NCP Version 4.0 is support of dial-in terminals emulating BSC 3270 protocol. Switched-line devices, such as personal computers, appear to mainframe applications as if attached to a dedicated line while using the less expensive dial-up lines, according to Comten. This capability is not available from IBM, Becker claimed.

Comten ACF/NCP Version 4.0 will be available in an early support program in the second quarter and will be made generally available in the third quarter.

U.S. licensing fees are as follows: For the Comten 5620 Communications Processor version of ACF/NCP Version 4.0, $1,936 annually; for the Comten 3690 or 3695, $1,344 initial fee and $4,928 annual fee; for the Comten 5660, $2,016 initially and $7,392 annually.

License fees for enhanced network addressing are as follows: For the Comten 5620, $1,056 annual fee; for the Comten 3690 or 3695, $576 initial fee and $2,112 annual fee; and for the Comten 5660, $864 initial fee and $3,168 annually.

NCR Comten also added a version of Comten Network Gateway (CNG) that supports enhanced network addressing and IBM's ACF/VTAM Version 3 Release 1.1 and Multisystem Network Facility.

CNG interconnects up to eight independent systems network architecture (SNA) networks without requiring users to change current network-naming conventions, operation management or security.

Host-free subdivision

Users can subdivide an SNA network into several smaller units and then interconnect them via the gateway. IBM's SNA Network Interconnect performs the same functions but "requires heavy mainframe use, while we allow cross-connection without involving the front-end processor and host," Becker said.

The new release of Comten Network Gateway will be available in the first quarter.

U.S. license fees are as follows: $1,100 initial fee and $2,200 annual fee for the Comten 5620 Communications Processor; $2,200 initial fee and $4,400 annual fee for the Comten 3690 or 3695; and $3,300 initial fee and $6,600 annual fee for the Comten 5660.

LAN industry

FROM PAGE 43

wiring; and the availability of PC-based multiuser application software packages from leading vendors such as Microrim, Inc. and Ashton-Tate.

The report indicated, however, that LAN products still fail to address problem areas that have plagued the industry since its inception. For example, only 15% of 68 large organizations surveyed by IDC believe that PC LANs today are effective substitutes for departmental minicomputers.

The report adds that "LANs are still difficult to install and debut, expensive [average cost per PC exceeds $1,000] and require extensive training. Many organizations are *still* looking for LAN applications which justify the cost and difficulty of installing LANs."

LAN future bright

Several favorable trends highlighted in the report should result in steady growth in LAN installations, according to the IDC report. The typical PC LAN today links eight nodes; today's typical PC LAN is also unconnected to other networks or to host systems through gateways.

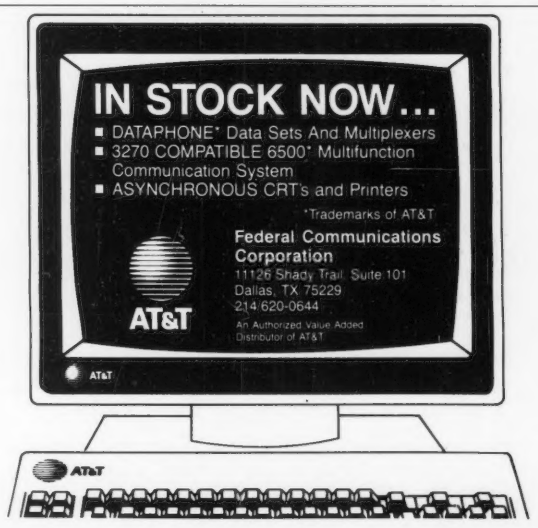
However, the report goes on, "the introduction of low-cost [under $10,000] Intel Corp. 80386-based servers in late 1987 will offer PC networks the CPU power to link more workstations, improve network speed and offer advanced communications gateway functions.

"However, the full effects of the 80386-based systems will not be felt until Microsoft Corp. makes available a new version of MS-DOS that takes full advantage of 80386's increased power with features such as 32-bit addressing and extended RAM [read-only memory] support."

That operating system is not expected to be released until the middle of this year, according to IDC.

In the overall LAN market, manufacturing systems will be the fastest growing segment, with shipments increasing at a compound annual rate of 70% between 1984 and 1991, according to IDC (see chart page 43).

The overall market during the same period will grow at a compound annual rate of 35% with an expected $3 billion in shipments by 1991. The PC LAN market will also grow at 35% per year during the same time frame, IDC predicts.



NEW PRODUCTS

Local-area network hardware

Mitek Systems Corp. has announced implementations of its **SNS Presentation Services** for Digital Equipment Corp.'s VAX and Microvax computers running the VMS operating system and IBM Personal Computers using IBM PC-DOS.

Both implementations utilize Mitek's approach of distributed Systems Network Architecture (SNA) services for Transmission Control Protocol/Internet Protocol Ethernet local-area networks (LAN). The SNA Network Server provides Ethernet LAN connectivity either directly channel-attached to an IBM mainframe environment or remotely attached, with speeds of up to 64K bit/sec.

Pricing for the SNA Network Servers ranges from $21,000 to $29,500. Pricing for the SNS Presentation Systems ranges from $750 to $4,500.

Mitek Systems, 2033 Chennault Drive, Carrollton, Texas 75006.

Network services

Dow Jones News/Retrieval has introduced an enhanced version of its Dow Jones Tracking Service, **Track**, that allows users to automatically monitor stock quotes and news from their micros.

Track allows users to create and monitor as many as five groups of up to 25 companies contained within Dow Jones News/Retrieval. Users now have the option of viewing only the news information or stock price quotations of the companies included in the profile.

Membership options to Dow Jones News/Retrieval include a corporate membership for $49.95 and a personal membership for $29.95. Track users pay a $5 monthly fee plus standard use charges.

Dow Jones News/Retrieval, P.O. Box 300, Princeton, N.J. 08543.

Customer-premise equipment

Voice Control Systems has announced the **VCS1000** speaker-independent voice recognition system.

The VCS1000 is said to support an 82-word vocabulary divided into three application areas: home security, machine control and telephone function control. It responds to any speaker without having been trained to the speaker's voice.

The system does not require a separate computer system for operation.

VCS is priced from $995, including a microphone and voice-response software appropriate for the particular application.

Voice Control Systems, Suite 100, 14140 Midway Road, Dallas, Texas 75244.

Links

IBM has announced that the Interactive Communication Facility Finance Subsystem of IBM's System Support Program (SSP) for the System/36 has been enhanced to include primary **communications support** for the IBM 5170 Personal Computer AT Model 849.

The connectivity enhancement is said to allow all models of the departmental processor line to communicate with IBM's 4680 Store Systems point-of-sale (POS) terminals. The 5170 PC AT Model 849 acts as a communications controller for up to 128 4680 POS terminals, acting as a gateway between them and a host processor such as the System/36.

Release 5 Modification Level 1 of the SSP communicates with the 5170 PC AT through IBM's SNA/Synchronous Data Link Control (SDLC).

IBM's Interactive Communication Facility Finance Subsystem costs $1,600 for System/36 Models 5360 and 5362 and $1,500 for the System/36 Model 5364.

IBM, 44 S. Broadway, White Plains, N.Y. 10601.

Protocol converters

Simpact Associates, Inc. has announced a Digital Equipment Corp./Manufacturing Automated Protocol (DEC/MAP) interface called the **MAP7510 subsystem.**

The product is said to provide an interface to MAP 2.1 broadband networks for DEC Microvax II computers. The subsystem consists of a Q-bus-compatible controller and modem assembly, a distribution panel kit and applications interface software for the host.

Prices for the MAP7510 subsystem range from $6,000 to $12,000.

Simpact Associates, 9210 Sky Park Court, San Diego, Calif. 92123.

Electronic mail

Interactive Network Technologies, Inc. has introduced **Intermail PC**, its IBM Personal Computer interface for the Intermail system.

Intermail is a desktop communications system that enables users to exchange electronic mail and files. The Apple Computer, Inc. Macintosh version also allows users to move object- or pixel-oriented images from one Mac to another. Its server-to-server feature lets micros on both local and remote networks communicate.

Intermail PC is site licensed at $199 per server for IBM PCs and compatibles.

Interactive Network Technologies, 20 Amy Circle, Waban, Mass. 02168.

INGRES SEMINAR

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1986 and 1987 Digital Review Target Award Winner

HARD TALK

James Connolly

IBM invades DEC territory

With so much attention focused during the past year on Digital Equipment Corp.'s incursion into IBM's world of commercial data processing, it has been easy to overlook the fact that a second company is trying to drive into the heart of a competitor's territory.

The irony is that the second company is IBM and the competitor, naturally, is DEC.

Some users and most industry observers have been talking about DEC's efforts to profit from certain IBM weaknesses, such as poor connectivity in the mid-range processor market.

One of DEC's stated goals is to increase its presence in commercial DP, particularly in the major corporations that historically have been IBM's best customers. DEC says it is promoting its distributed processing approach for new applications rather than trying to replace IBM mainframes, although DEC did make a point

Continued on page 51

Users evaluate Wang VS 7150

BY ALAN J. RYAN
CW STAFF

Users of Wang Laboratories, Inc.'s VS 7150 machine recently said Wang seems to have eliminated the kinks in its VS Operating System Release 7 and that the unit runs well, but true performance figures will not be available for a number of months.

Wang announced a restructuring of the top half of its minicomputer line in mid-January and introduced the VS 7000 series to succeed the VS 85, VS 100 and VS 300 [CW, Jan. 19].

"Speed-wise, [the VS 7150] is just like a VS 300 internally," said Phil Dowlin, director of information services at Midcon Services in Houston. He said the unit was set up at his company in early January.

Dowlin claimed Wang's latest offering has doubled the performance of his VS 100. Midcon, a natural gas pipeline company, continues to run its VS 100 and three VS 300s.

"As far as we're concerned, [the VS 7150 is] very stable," claimed Alan Wein, director of information services at insurance agency Cal-Surance Associates, Inc. in Torrance, Calif. "It took a few days to get the thing going, but it's been stable ever since."

Cal-Surance was not using a Wang installation prior to the purchase of the VS 7150. "But all I can say is it is giving us very good response time," Wein commented, adding that the unit is not currently being used to its full potential.

Although he said he was slightly nervous running the unit's software because of some reputed problems with running Wang's VS Operating System Release 7 on the VS 300, "those haven't been repeated. We're on 7.11, and it's absolutely rock solid," Wein said.

"Certainly I've heard about unreliability with the 300 operating system, and the [VS 7150] is just a stripped-down 300,"

Continued on page 51

Flexos operates with industrial Intel 80386

BY DAVID BRIGHT
CW STAFF

MONTEREY, Calif. — An operating system that takes advantage of Intel Corp.'s 80386 microprocessor for industrial applications was released recently by Digital Research, Inc.

With the latest version of Flexos, Digital Research joins the rush to develop operating systems specifically for the powerful 32-bit chip.

Digital Research describes Flexos as a real-time, multitasking operating system with the power of Unix and the programming ease of a Microsoft Corp. MS-DOS environment.

The Flexos 386 beta release is scheduled for distribution in the second quarter. Like the current Flexos 286 version, Flexos 386 will support Intel's 82786 advanced graphics coprocessor.

Also planned for the two versions of the operating system is an emulation feature for concurrently running some MS-DOS applications in the processors' protected mode to make real-time applications run more smoothly. With Flexos 286, the processor does not switch to real mode; Flexos 386 uses the 80386 chip's Virtual 86 mode.

One of the first implementations of Flexos will be performed by American Manufacturing Systems, Inc., which is designing a system for controlling factory automation equipment. Currently an alpha-test user, the Maitland, Fla.-based company will combine the operating system with its own 80386-based board and 80186- and 80286-based single-board computers on an Intel Multibus II backplane.

The firm plans to produce beta units of its system by the end of June, according to President Jerry Horn. Priced at less than $200,000 for a complete system, the system will be used to orchestrate work cells such as robots and milling machines, he said.

M6000 gets growth, power kick

BY JAMES CONNOLLY
CW STAFF

IRVINE, Calif. — McDonnell Douglas Computer Systems Co. has enhanced three of the five models in its M6000 line of small business systems.

The three models, introduced in January 1986, were reportedly enhanced to include technology included in the two high-end models announced in October. The additional features, including a new operating system release, were designed to provide more power and growth capabilities while freeing up backplane slots.

The enhanced models are the M6415, M6425 and M6635. The comparable earlier models were the M6310, M6325 and M6527.

The upgraded models run a new level of McDonnell Douglas's Reality relational data base management-oriented operating

Continued on page 51

Inside

Workstation emulates IBM 5250

IRVINE, Calif. — AST Research, Inc. has introduced a workstation based on the Intel Corp. 80286 microprocessor and designed for use as a standalone workstation or in IBM 5250-emulation mode with IBM minicomputers.

The AST 5250-Premium/286 is said to combine the processing power of AST's IBM Personal Computer AT-compatible microcomputer with 5250 emulation that enables communication with an IBM System/34, 36 or 38 minicomputer.

The product uses a bus architecture that operates with zero-wait states, which the company said increases computing speed to 1½ times that of the PC AT. It can reportedly function as a gateway from a local-area network or as a cluster controller supporting Microsoft Corp. MS-DOS personal computers or Digital Equipment Corp. VT100-type terminals.

The 5250 emulation capabilities are said to include all 32 IBM 5251/11 display and field attributes and up to seven simultaneous System/34 through System/38 sessions. It was designed to emulate various IBM display terminals and support twinax and remote communications.

The company said the bidirectional file-transfer software eliminates rekeying errors and enables manipulation of System/34 through System/38 data using personal computer software such as Lotus Development Corp.'s 1-2-3. It also supports various System/34 to System/38 software packages. A hot key allows users to toggle between MS-DOS and System/34 to System/38 sessions.

The company said several 5250-Premium/286 models are available. Options include an AST-5250/Gateway option for a single connection between an IBM Netbios network and a System/34, 36 or 38, an AST 5250/Cluster Controller option supporting up to four additional personal computers and the AST 5250/Async Dial-up option that enables a user at a remote site to run 5250 emulation using a standard telephone line and a modem.

The AST 5250-Premium/286 with 1.2M-byte disk drive, a display and twinax emulation costs $3,095. A 20M-byte version costs $3,595.

ADDS system to support 32 terminals

HAUPPAUGE, N.Y. — Applied Digital Data Systems, Inc. (ADDS), has introduced an entry-level member to its ADDS Mentor 6000 series of 32-bit multiuser systems.

The company said the Model 2 is designed to support 32 terminals and printers while using the same architecture of ADDS's larger Models 4, 6 and 8.

"This newest member of the family packs a powerful price/performance punch, making it an ideal solution in a decentralized office environment where large amounts of processing power serving up to 32 users is a requirement," said Robin White, vice-president and general manager of ADDS's Systems Division.

"Its target market consists of fast-growing small businesses which demand sophisticated computing power now and expandability for the future," White continued.

It runs the Mentor Operating System, ADDS's enhanced implementation of the Pick Systems, Inc. Pick operating system and uses a Motorola, Inc. 68020 microprocessor.

The basic configuration includes an 85M-byte disk drive, a cartridge tape drive, 1M byte of memory, eight serial ports, one parallel printer port and a console terminal. That configuration costs $24,000.

IBM enters

CONTINUED FROM PAGE 49

of offering its multiple-CPU VAX 8974 and 8978 high-end systems as alternatives to traditional mainframes.

The severity of the DEC-vs.-IBM confrontation came to light in honest observations made by a couple of managers of combined DEC/IBM computer operations who were interviewed after the 8974 and 8978 were introduced. Each manager runs DEC equipment on the scientific/engineering side of his shop and IBM gear in his commercial operations.

Asked if they had noticed increased efforts by DEC sales agents on the IBM side, the managers expressed surprise. The reverse is true, they said. The real sales push they see is IBM's drive into the technical computing arena, the area in which DEC built its reputation.

The managers acknowledged their circumstances might prove exceptional if it turns out that they happen to be in geographic areas where DEC has not yet beefed up or stimulated its sales force.

Putting in overtime

Those managers said IBM has been working overtime to promote its 4381 small mainframes and 9370 mid-range system as technical computers. They noticed the continuing emphasis IBM has placed on technical computing in every 3090 mainframe announcement.

Much of that promotion has been related to the 3090's vector facility, which lets customers serve commercial and technical users with a single mainframe rather than making them buy separate superminicomputers, such as VAXs, for basic engineering and scientific applications. That strategy fits with what IBM tried to do more than 20 years ago when it developed its 360 mainframe, providing the first single architecture for commercial and technical applications.

Nobody expects IBM and DEC to trade places. One will not see IBM abandoning the commercial DP market, and DEC will not leave the technical market, but it could be interesting during the next year or so to see how the companies offset lost accounts in each market.

It also raises the concern that DEC, with fewer resources than IBM, may insult its longtime technical users by paying too much attention to the IBM-dominated commercial market. Similarly, IBM cannot take for granted the loyalty of what some call "all Blue" MIS shops, which have accepted enough DEC equipment already to make IBM executives take notice. Those executives cared enough to bring 500 MIS executives to Florida recently for the most high-powered briefing session IBM has offered.

Connolly is *Computerworld's* senior editor, systems & peripherals.

M6000

CONTINUED FROM PAGE 49

system, which is based on Pick Systems' Pick operating system.

Like the models they replace, the enhanced systems are said to support between 512K and 1M bytes of memory. The M6415 and M6425 reportedly support up to 225M bytes of disk storage, and the M6635 is available with up to 485M bytes of disk storage. Ports supported a range of 16 on the M6415 to 48 on the M6635.

Prices of the enhanced systems, which range from $26,000 to $41,000, are the same as they were for the comparable earlier models.

Users evaluate

CONTINUED FROM PAGE 49

Wein admitted. "I had some concern that we would have some reliability problems, but that's not been proven. I've been very pleased."

Cal-Surance is using Wang's local-area network, Wangnet, to connect the VS 7150 with 20 users. "That's been working fine also," Wein noted. Once the company implements a Wang-based insurance agency package from Harte Systems, Inc. in Oak Brook, Ill., the number of users will jump to more than 70, Wein said. That is expected to happen by May.

Cal-Surance is currently using the unit with Wang WP Plus and Wang Office for program development, implementation and training activities.

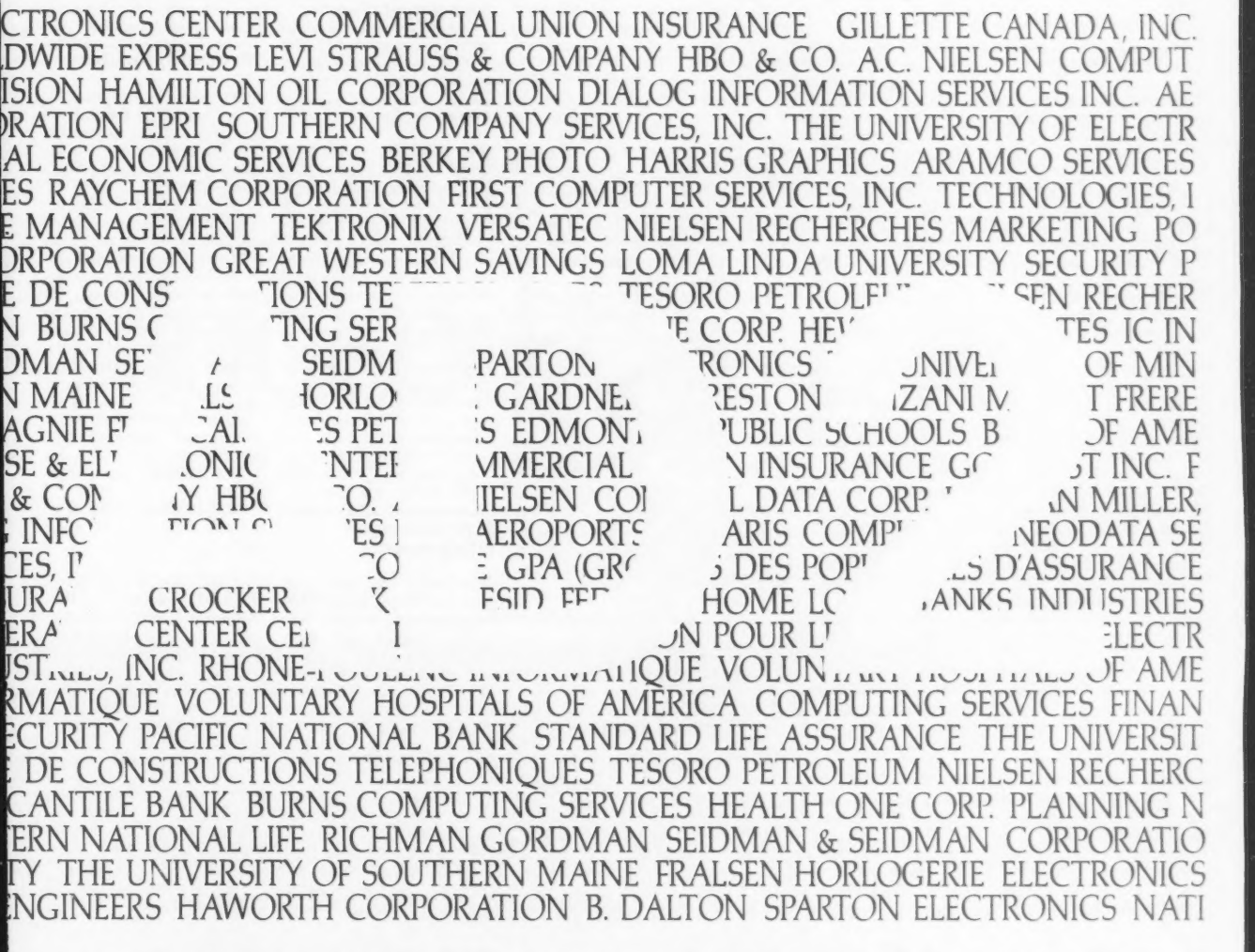
At Midcon, the VS 7150 is used as an executive system, Dowlin explained. "It's the one that all the managers, directors and up to the president of the company are all tied into with the management software that they access."

Midcon uses the VS 7150 to track contracts, points, calculation of supply, planning and sales and delivery, Dowlin said. Midcon follows all of the production data on some 550,000 oil and gas wells each month.

Dowlin said his VS 7150 is connected, via an IBM SNA network, to an IBM 3081, a National Advanced Systems Corp. 6000, two Digital Equipment Corp. minicomputer units — including a VAX — and a Concurrent Computer Corp. minicomputer. There are 90 Wang workstations tied into the VS 7150 and 700 workstations connected to the network.

While an upgrade of the machine would require only a box swap and there would be no problem with the software, "I doubt I'd upgrade," Dowlin said, because his select group of users must have access to data quickly. "I'm not going to load that machine down with users."

A FEW GOOD NAMES THAT



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NEW PRODUCTS

Processors

Nemonix, Inc. has announced **Version 2** of its **Synchronized Clock Accelerator** option for the Digital Equipment Corp. VAX 11/750.

Version 2 provides greater throughput speed. It is a backplane attachment said to increase the clock speed of the 11/750. It incorporates an on-line/off-line switch that enables the user to isolate the accelerator.

The Synchronized Clock Accelerator costs $8,200.

Nemonix, 106 South St., Hopkinton, Mass. 01748.

EMC Corp. has announced a **4M-byte** and an **8M-byte memory board** for the Wang Laboratories, Inc. VS 300 system.

The memory arrays, said to be designed with 256K-byte random-access memory (RAM) and very large-scale integration (VLSI) technology, are compatible with all VS 300 systems. Both boards feature a power light and an activity light for monitoring main memory-level usage.

The 4M-byte memory board costs $19,200. The 8M-byte board costs $38,400.

EMC, 171 South St., Hopkinton, Mass. 01748.

Iverson, Inc. has introduced the **Ivac 750**, an accelerator card for the Digital Equipment Corp. VAX 11/750.

The Ivac 750 is said to improve system speed by providing a new clock that pulses variably, according to the exact time required for each instruction, rather than a fixed pulse. The accelerator plugs onto the back of the backplane of a VAX 11/750.

According to the vendor, the Ivac 750 is transparent to system- and application-level software. It features an on/off toggle switch for returning the CPU to its standard clock.

The Ivac 750 costs $9,950.

Iverson, 850 Auburn Court, Fremont, Calif. 94539.

Aida Corp. has announced three simulation accelerators: the **Personal Simulator Processor** (Persim) **Models 1 and 2** and the **Software Simulator Processor** (Softsim).

The Persim Model 1 is said to be capable of simulating up to 64,000 gates at 1 million gate evaluations/sec. The Persim Model 2 can simulate up to 128,000 gates at 2.5 million gate evaluations/sec. Both models are IBM Personal Computer AT bus-compatible and were designed for use with the Apollo Computer, Inc. DN3000 workstation.

Softsim can handle up to 64,000 gates at 20,000 gate evaluations/sec. It is compatible with any Apollo workstation.

Persim Model 1 costs $7,500. Persim Model 2 costs $20,000. Softsim is included with the Aida Design System.

Aida, Suite 342, 3375 Scott Blvd., Santa Clara, Calif. 95054.

Input devices

Barcode Industries, Inc. has added a series of bar code readers to its **Mindreader** product line.

The bar code readers are said to support IBM 3179, 3180, 3191, 3196 and 5291 terminals as well as Digital Equipment Corp.'s VT220 and VT240, Unisys Corp. UTS-30, AT&T 6300 and 7300, Zenith Data Systems Corp. 148, 150, 151 and 241 and Wyse Technology, Inc. 50.

The readers connect to the terminals as wedges between keyboard and screen. Signals from the bar code reader emulate input from the keyboard. Input devices that are supported include pens, laser scanner and bar code badge readers.

The Mindreader line ranges in price from $595, including

Barcode's *Mindreader*

light pen, to $2,090 including hand-held laser scanner.

Barcode Industries, 17 Barstow Road, Great Neck, N.Y. 11021.

Data storage

Distributed Logic Corp. (Dilog) has announced the **DQ606** floppy disk controller for Digital Equipment Corp. Microvax, MicroPDP-11 and LSI-11 systems.

The controller is contained on a single dual-height board and is compatible with DEC's Mass Storage Control Protocol driver. It is also compatible with standard RX50 drives and media.

The DQ606 is said to store controller specification information in nonvolatile random-access memory. It has an on-board formatter and an 8K-byte buffer. It supports 16-, 18- and 22-bit Q-bus addressing in block and nonblock memory modes and can inhibit the standard direct-memory addressing increment.

The DQ606 costs $950.

Dilog, P.O. Box 6270, 1555 S. Sinclair St., Anaheim, Calif. 92806.

EMC Corp. has introduced the **Falcon Series** of mass storage products for the Hewlett-Packard Co. HP 3000 computers.

The Falcon I subsystem is configured with 388M bytes of mass storage. The Falcon II has 776M bytes of storage. Both combine Winchester disk drives with EMC's disk-cache processing cards, which feature 4M bytes of high-speed cache.

Up to six Falcon I subsystems can be combined in a single cabinet for a maximum capacity of 2.3G bytes of storage. Up to four Falcon II subsystems can be housed in one cabinet for a maximum capacity of 3.1G bytes.

Falcon I is priced at $12,900, and the Falcon II costs $23,400.

EMC, Natick Industrial Centre, Natick, Mass. 01760.

Terminals

Burr-Brown Corp. has introduced the **TM8450**, a multifunction microterminal or numeric data entry application.

TM8450 accepts data both manually and through automatic identification interfaces such as bar code wands, laser scanner and magnetic stripe readers.

The base unit is said to contain display and keyboard with 23 keys. It can operate as a simple display, two 80-character lines at a time; can send and receive block mode data; and can operate as a troubleshooting communications monitor.

The TM8450 costs $795.

Burr-Brown, P.O. Box 11400, Tucson, Ariz. 85734.

Maintenance Equipment

Gen/Comp, Inc. has introduced its **Model 2042 DMA Interface** for the Unibus.

The interface and interprocessor link is said to emulate the Digital Equipment Corp. DR11-W, DR11-B or DA11-B. It features hardware parity generation and checking of transferred data to assure integrity. It provides switch-selectable direct-memory addressing (DMA) pacing. Interface can be selected through the range of 30,000 to 500,000 words/sec.

The Gen/Comp Model 2042 DMA Interface costs $1,000. An optional on-board opto-isolator for long-line data transmission costs an additional $500.

Gen/Comp, 6 Algonquin Road, Canton, Mass. 02021.

Printers/Plotters

BDT Products, Inc. has introduced its **DL-500 Emulator**, a hardware controller said to allow word processing systems to upgrade from daisywheel printers to laser printers.

According to the vendor, the DL-500 provides laser printing capabilities to more than 250,000 stand-alone word processing systems from such companies as Lanier Business Products, Inc. and CPT Corp. The DL-500 Emulator used on these systems provides system compatibility to laser printers from vendors such as Hewlett-Packard Co., Ricoh Corp., Xerox Corp. and Epson America, Inc. It is also compatible with BDT sheet feeders.

The DL-500 is priced from $1,295.

BDT Products, 17152 Armstrong Ave., Irvine, Calif. 92714.

Interleaf, Inc. has announced the **LPR-308** and the **LPR-326S**, two printers compatible with IBM's RT Publishing Software package for the IBM RT Personal Computer.

Both printers feature resolutions of 300 dot/in. The LPR-308 prints 8 page/min and the LPR-326S prints 26 page/min.

RT Publishing Software features integration of text and graphics and a what-you-see-is-what-you-get display.

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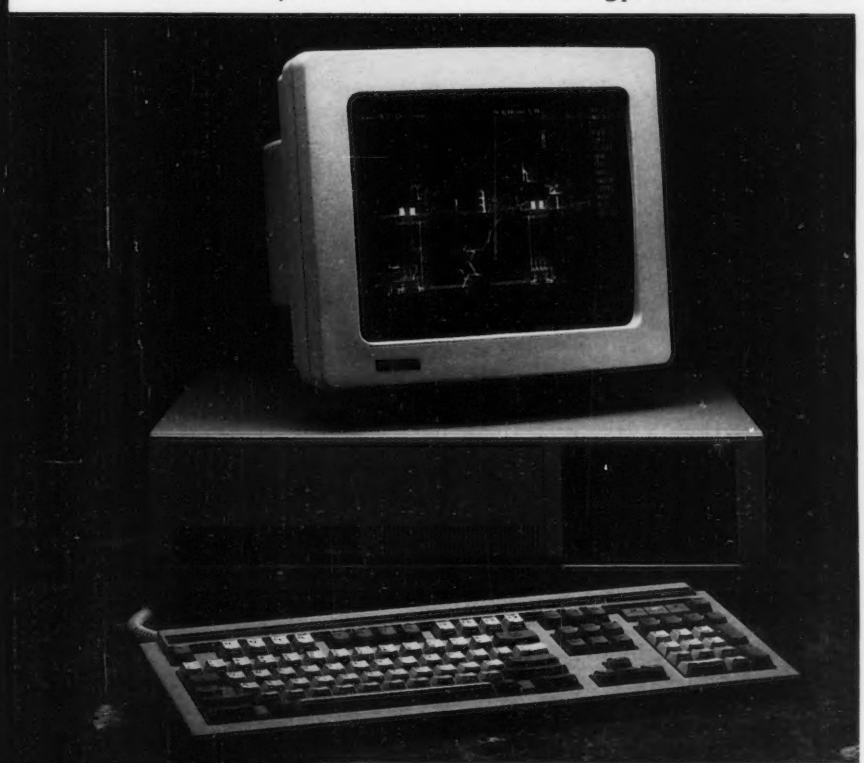

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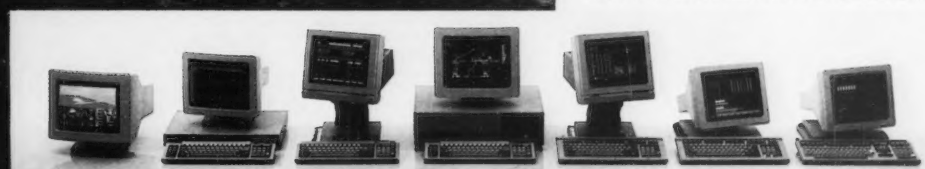

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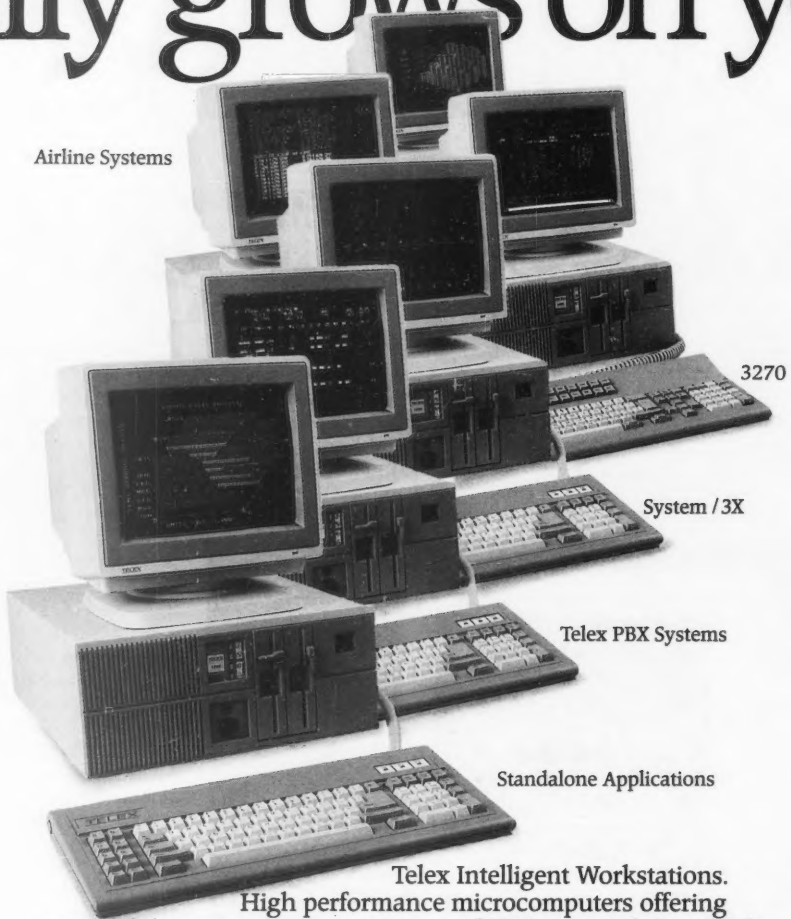

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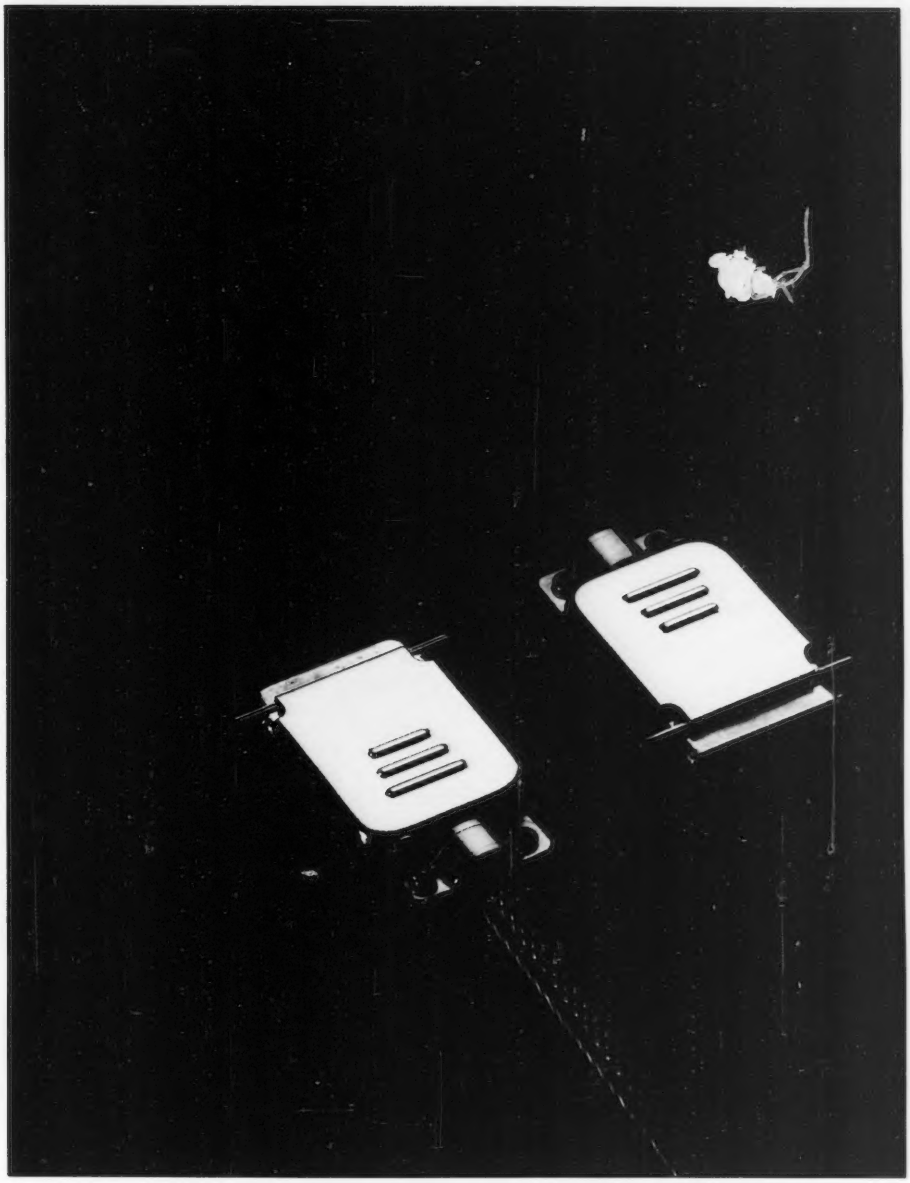

Micro-to-mainframe connectivity won't be complete until users can get information in job-ready form. Real linkage involves solutions, not just technology.

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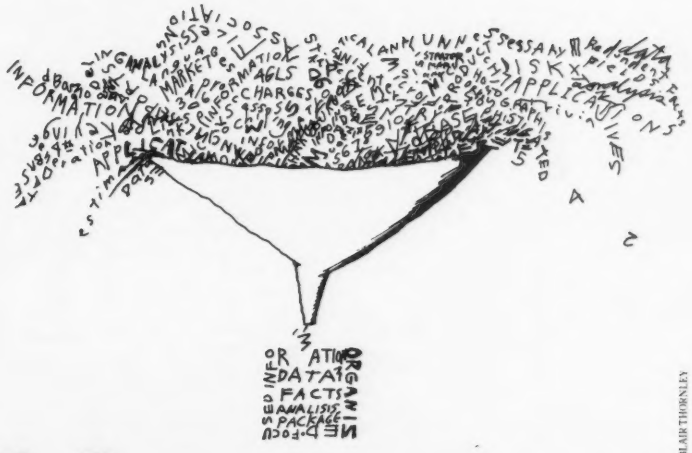
The next step is to make extraction of data from mainframes a user-driven, application-oriented process.

THE WORK CONNECTION

BY MERV ADRIAN



BLAIR THORNLEY

Micro-to-mainframe users are beginning to demand solutions. They have had their fill of partial answers in the form of technologies like terminal emulation or file transfer or applications development tools. Now, what they are really looking for is the ability to get the data they need to get their jobs done — when they need it and in the form they need it.

Until recently, users appeared to be content with much less. Requests usually focused on access to this or that specific data base or the ability to use the information in this or that production report without rekeying.

As a result, not many organizations looked at the problem from an organizationwide perspective. Application by application, they eventually provided access to the necessary data. Programs were written to do the necessary extraction and to set up subset copies of the production data bases for the micro community.

How and why micro-to-mainframe implementation stalled for so long has something to do with the technology's evolution as well as with its basic nature.

At the beginning of the micro era — when these machines were still listed on expense vouchers as "office supplies" — stand-alone applications were perfectly sufficient.

A small spreadsheet for a local need, a little word processing for memos, maybe some rudimentary data bases to support the local salesmen's Christmas lists — these were all we needed.

Eventually, though, people began to realize that they could get double duty out of these new boxes — and, incidentally, help to justify the expense — by using them to emulate terminals. Then it was discovered that, better yet, some of the terminal emulators actually permitted file transfer, so users could move data from the mainframe right into their micros.

It did not take long for reality to rear its ugly head, however. The files were much too big. Even a few thousand records could tie up the micro for hours. The process was quicker than typing in all the data from reports, and it was less prone to error, but the data usually had to be massaged extensively once it was downloaded.

There were loads of unnecessary fields, several times too many records, and every time a slightly different set was needed, someone had to start programming a new request or a new way of extracting the necessary data from that big morass.

Well, we have certainly progressed beyond that now, haven't we? Surprisingly, the answer is no.

Even in large companies that have invested heavily in micro-to-mainframe technology, links are often used for nothing more than simple file transfer.

The reason for this gap between need and actual use is a lack of understanding about what micro-to-mainframe links are and what they can do.

Precisely because these products tend to fall

Adrian is chairman of the micro-to-mainframe Special Interest Group of the New York PC Users Group and a project manager at a New York brokerage firm.

Connection

FROM PREVIOUS PAGE

between two well-developed bodies of expertise that are generally mutually exclusive, a full view of the issues is rare.

A major personal computer-oriented publication, for example, recently presented a cover story on micro-to-mainframe products.

Were there reviews of vendor-specific links from fourth-generation language vendors, products capable of using mainframe storage for micro data accessed as virtual floppy disks or generalized link packages that permit data extraction from a variety of different file formats for transfer to the PC?

No. The article was exclusively about terminal emulation boards.

It would be easy to blame the problem on poor media coverage, but it would not be accurate. Several PC-oriented magazines have done extensive reviews and product comparisons. The mainframe publications have also done their part.

Put more precisely, the problem is that each publication has a different emphasis.

Growing significance

There are a number of reasons that the micro-to-mainframe issue is becoming increasingly significant. These reasons include the following: the growing number of micros in major firms; the growth of applications built around the micro products that have become analytical standards, such as Lotus Development Corp.'s 1-2-3 and Ashton-Tate's Dbase family; and the continuing decentralization of DP work as departmental computing takes hold via local-area networks (LAN) and minicomputers and soon the new IBM 9370s.

As the demand for micro-to-mainframe products has heated up, vendor after vendor has provided micro support, links or stand-alone packages.

This is especially true in the market for information center products. Fourth-generation languages, sophisticated graphics and statistical analysis, financial modeling and so forth have been provided.

Heavy involvement

The fourth-generation-language vendors have been heavily involved in the early stages of this delivery.

One by one, these vendors have created, with varying degrees of success, products that permit the users of their data base management systems and graphics or modeling tools to access and use the data on microcomputers.

A good example of this is Information Builders, Inc.

Information Builders' Focus product is far and away the dominant fourth-generation language.

Installed in 46% of the information centers that use a fourth-generation language, Focus runs in IBM's MVS, DOS and VM/CMS environments; on Digital Equipment Corp. VAXs; Wang Laboratories, Inc. VS hardware; and on AT&T's 3B series under Unix.

Information Builders' PC/Focus was the first, and is still the most complete, implementation of a mainframe fourth-generation language on a PC.

Currently, it is in Release 2.0, and part of the continuing effort to upgrade the product has been the extension of its micro-to-mainframe capabilities.

Incorporates data access

In December, Information Builders took a totally different tack with its marketing with the introduction of the Focus Data Connection.

This product, which is essentially the communications piece of PC/Focus, incorporates the menu-driven Talk technology that has been used throughout the Focus product line for some years now and the Focus Report Writer module from the mainframe product.

Perhaps most significantly, Focus Data Connection incorporates the various interfaces to other file architectures that Information Builders has continually offered and added to with its mainframe product.

The significance of all this is that Information Builders has decided to target another market: the users who may not want or need Focus in its complete form but who do need a general data access method, standard interface and the ability to move data to the personal computer in a form readily usable by micro applications.

The company's success with that exact set of features in its own user community led it to believe that a significant market was out there for similar capabilities in non-Focus shops.

So Lotus in its market, and Information Builders in its, both perceived a ground swell of demand for data extraction and movement and reformatting that was not being met by current products.

These features define the core product that is now being sought by users (see story this page).

What users have now

The next question is this: Are users getting this from anyone today?

What is being delivered today is a bewildering array of products from all sorts of vendors.

To make sense of it all, it is useful to categorize the many efforts that have and are being made, utilizing two broad cate-

Continued on page S4

Data exchange today: It's not just PCs and mainframes anymore

There is a persistent tendency to define micro-to-mainframe products as boards that emulate terminals in an IBM 3270 environment. In fact, the reality is far broader. What is more, rudimentary file transfer capabilities are only one part of the job description.

First, let us dispense with the idea that personal computers and mainframes are the sole components of today's computing environment.

Vastly more complex configurations — involving minis and mainframes from several manufacturers, protocol converters for asynchronous access, local-area networks and more — are needed to satisfy current information exchange requirements.

Data exchange between CPUs may also be involved if PCs emulating terminals on one vendor's system need data residing on a different vendor's mainframe.

These are not simple problems, but they are not insuperable either, and they are just as good an example of workstation-centered data access as an IBM Personal Computer with a Digital Communications Associates, Inc. Irma board communicating with an IBM mainframe running MVS. Micro-to-mainframe links are near the end of their run as an issue. They will increasingly be subsumed by workstation data links.

Just what are the components of a workstation data link? They may be conveniently broken down into three parts that represent the major steps in utilizing the link: data extraction, data movement and data restructuring.

These pieces correspond to the three hardware and software environments involved in the link: the mainframe source data structure, the communications network and the workstation.

Data extraction involves far more than simply finding a file. A number of issues that have plagued information centers revolve around this process. Obvious ones are access, integrity of data and physical availability.

Consider the following: I have security access rights to a file. Even if providing myself and other micro users with that access did not in some way compromise the integrity of that data — for example, by permitting the accidental upload of model data into a production file — it may still turn out that the data is not even available on-line.

The data might, for example, be in a generation data group on tape, which means that the typical micro user may not have the tools or the skill to arrange to have the tape mounted. In fact, the user may not even know how to identify the particular tape at all.

Even if it is assumed that all these problems are solved, however, a serious issue remains: What am I going to do with a typical production file that may run into the millions of records and that may be in a format for which I have no ready access method available?

For example, how can I get data out of a VSAM file, an IMS or an Information Builders, Inc. Focus data base or get the 1,200 records I specifically need from a six-million-record flat file structure? Data extraction deals with all these issues.

> THE characteristics of the data link are, or should be, speed, accuracy, generality and transparency.

First, of course, data extraction must provide ready and understandable access to the data. If I have to ask for Cobol code from the DP staff every time I need a newly defined data subset, I am going to run into the same applications backlog that micro-to-mainframe products are supposed to alleviate. It is necessary to have some form of data dictionary that a user can scan to determine which data elements are needed.

Second, data extraction must permit selective or conditional retrieval of the required elements based on some logical screening — for example, state equals Utah — or computation — for example, total sales for the region is greater than $10,000. Note that the computation may not be possible until retrieval time. In the regional sales example, the sales may not be summarized by region until I summarize them as part of the extraction process itself. The product must permit this kind of dynamic postretrieval, pre-output selection capability.

Third, the data extraction component should pass the data to the link with definition information built in so as to facilitate processing across the link itself as well as at the micro end.

Moreover, the data should be compressed wherever possible. Transfer rates being what they are, even carefully optimized queries can take a long time to process if more than a few hundred records are transferred.

Data movement should be relatively hardware independent. That is, it should be viable to use Irma boards, IBM boards, modems with various software packages and so on with the product.

It also follows that the interface should be stable throughout these environments. Other than setting parameters in an asynchronous world where they are required, the user should not have to do anything different if a different link technology is implemented. The characteristics of the data link are, or should be, speed, accuracy, generality and transparency.

The custom wiring of communications protocols for a specific application may be very satisfying for those involved and might even optimize the particular data transfer involved, but in the long run it is the wrong approach. It creates a need for continual in-house support, which is a serious management problem in a very technical field characterized throughout the industry by high turnover.

Furthermore, the acquisition of new technologies, like X.25 or satellite links, imposes a development burden better borne by the commercial product vendors that are committed to supporting the users who are paying them for their services.

Data restructuring is a fairly simple process, yet one that has not received sufficient attention from link vendors. Certainly the improved import capabilities of the current micro packages make it more simple than ever to take data coming in and mold it into the necessary form.

But why should the micro user need to do that at all? The difference between putting some financial data into comma-separated variable form or putting the same data into Lotus .WK1 form, for example, is utterly trivial to the mainframe but significantly less trivial for the micro, especially as the file size increases.

For the user, mastering the particular import commands is a waste of time. The user should be able to ask for data and have it as easily as if the data were already on the hard disk. Obviously, transfer time itself is a limiting factor in the ease of use, but if the data is already structured, the user may never have to leave the application software.

The goal of data restructuring is to present the extracted information to the application in the form it can most easily, efficiently and transparently use.

MERV ADRIAN

INTERVIEW
NEW STYLE INTERFACING

The year 1986 may well be remembered as the year Lotus Development Corp. shook off the "one-product-company" image for good. Amid a host of acquisitions and new product releases, the company moved strongly into a number of areas, some more successfully than others.

In September, The Application Connection (T-A-C), announced in June, began shipping. T-A-C consists of software at both the micro and mainframe ends that is designed to extract, manipulate and transfer data between devices and to format it appropriately with the software at the other end.

Maurice Shore, product manager for Lotus, recently spoke about the product with Merv Adrian.

Can you categorize purchase responses to T-A-C?
It's running to our expectations. Remember, we shipped in September, so the typical evaluation cycle is ending now for the first group.

Your initial mainframe interfaces were all fourth-generation languages rather than production-oriented data base management system products like Adabas from Software AG [of North America, Inc.] or IBM's IMS. Has that succeeded as a strategy?
Absolutely. We've actually discovered some very interesting trends. First of all, it's astonishing how widespread the Focus from Information Builders, Inc. plus SAS from SAS Institute, Inc. combination is. In fact, the "plus SAS" [option] itself is extremely widespread. Another interesting thing we've noticed is that, despite the wide availability of micro-to-mainframe products, and even in shops where some of these products are in-house, the number of people doing straight Irma file transfers is incredible.

No data extraction to speak of?
No, and where there is, it's usually Cobol code written by the traditional DP staff.

You don't seem to be finding demand for those production-oriented packages, then. What are you being asked for?
No. I've been very surprised at how little we've come under criticism for not providing direct bridges to production. We expected it to be much more of an obstacle. The shops we're talking to are already using the fourth-generation languages for access to that data, and, by and large, they're doing a very good job of it. The No. 1 request by far has been VSAM access.

You've committed to an IBM DB2 interface soon. Is that on schedule, and do you expect to tackle VSAM after that?
DB2 is on schedule. Right now we're testing it internally. I can't talk about plans we haven't announced yet.

Can you speak about your philosophy regarding the structure of micro-to-mainframe use in an organization?
It's inappropriate to hem an information center into a purely batch or on-line mode. It's preferable to give users the option to select the mode in which they create the extract program to execute on their machine — on-line, background batch or foreground batch submission. Some firms, with limited use and a high amount of available million instructions per second, want to stay in the on-line environment. Others want to submit queries to batch and store the responses for later processing. Our direction is to give them all those options.

That implies enhanced functionality on the personal computer side: validation, optimal query creation, some knowledge of the mainframe capabilities.
I can't really talk about any specifics at this point.

To date, you've been independent of the communications package in use. Do you see a need for Lotus to get into the link piece itself, either for optimization, as a marketing option or any other reasons?
Let's say this: It certainly makes sense to have a highly integrated offering available as long as we don't twist the arms of our customers who have already evolved their own alternative communications strategy. Most of them have, so our priority is to accommodate them.

So a modular strategy might make sense. You've already done that with both the mainframe and PC interface.
Yes, although there's nothing there yet. But let's go a little further. If you look at what information centers are trying to do for their end users, you could say they're building toolboxes to fit user needs. That translates into buying patterns. In order to accommodate their budgets, they build based on priorities. What vendors have to do is to be intelligent in unbundling the products to permit the customers to get at the pieces they need as they become critical.

Let me make another comment here. Some people are coming to us and saying, "We want to use your data transfer protocol; can you let us have the specifications?" For one reason or another, they don't want or need our complete product. We're trying to work with requests like these as much as possible because we're interested in standards too, and of course we wouldn't mind it a bit if our architecture qualified. That's another example of intelligent unbundling.

I'd like to turn to the micro side briefly before we close. At the rollout of the product, you had a Lotus 1-2-3 interface, a Lotus Symphony interface, which is now shipping, and an Ashton-Tate Dbase interface. There has been some press about you and Microrim working on an R:base piece. Can you talk about that yet?
In the same spirit that we look at standard transfer formats, we've considered it essential to get other products to work with T-A-C if it is to be as successful as we want it to be. Our intent is, as much as possible, to work with other micro product vendors to help them build their own interface to T-A-C. And yes, a perfect example of this is Microrim's release of R:base System V, in which Microrim developed a module with us that provides users with T-A-C integration. Another good example of this would be Ansa [Software Co.'s] interface to us from Paradox. Those interfaces should look like the products they come from, not like some Lotus-imposed standard; that's why we want the vendors to help them provide the interfaces themselves in cooperation with us.


ALAN WITSCHONKE

Maurice Shore

A final question: What is your advice to managers evaluating micro-to-mainframe products for possible purchase? Other than buying Lotus, of course.
Basically it's this: The criteria for success in micro-to-mainframe applications are just the same as they are for the other applications you implement and support. The most critical element of all is to know exactly what you want to do. Every DP manager knows the importance of specs; it's just as true here as it is anywhere else.

We get our share of tire kickers, people who just want to do a strategic evaluation of our product. We accommodate them, but the bottom line is that you can't evaluate a product unless you know what you want to do with it. Buyers must be intelligent about identifying real applications where a connectivity product will yield a rate of return worth their investment in it. •

Connection

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gories: vendor-specific products and generic ones.

Within each category, there are micro- and mainframe-oriented offerings, although, as will soon become apparent, even these distinctions are beginning to blur.

Vendor-specific products can be recognized by their close relationship to other products produced by the companies that market them. Some products are offered directly by their micro vendors, as is the case with Lotus's The Application Connection (T-A-C).

Introduced in mid-1986, T-A-C consists of software at both the micro and mainframe end that is designed to extract, manipulate and transfer data between devices and to format it appropriately with the software at the other end.

Group effort

Other products are the result of collaborative arrangements, like those Ashton-Tate has forged with mainframe product vendors.

THE REAL question here is twofold: One, how transparent is the import? And second, how easy is it to select, sort and reformat exactly the data needed?

The latter take the form of strategic agreements that permit the exchange of technical information, allowing one vendor's products to interface optimally with another's.

Given the dominance of Ashton-Tate's Dbase products in the microcomputer environment, it makes a great deal of sense for the company to seek these agreements, which would permit users of its products to import data after extraction from the mainframe vendor's file architecture.

It is less clear, however, whether the mainframe vendors see their best interests being served in this way. If the jointly developed product is their only product offering, it extends the potential use of their products for a client; if they have links of their own, however, it may compete with their own link/workstation product.

Issue: The user

The ability to import data is not at issue here; most micro products can handle output that has been created as flat files, especially if delimiters such as commas are used.

In fact, in any major micro analysis package, the import capabilities are generally robust and easily selected.

The real question here is twofold: One, how transparent is the import? And second — much more important to micro users with little mainframe expertise — how easy is it to select, sort and reformat exactly the data needed?

These two questions define the principal approaches taken by today's vendors.

Considering the micro-vendor-specific products, then, really comes down to understanding how much the transparency of data importation depends on the sophistication of the mainframe access capability.

It is very difficult to create a general data access tool that will permit transparent data extraction from many different mainframe architectures unless there exists a complete product structured in a modular fashion to permit the development of specific interfaces for those different architectures.

For transparency to be implemented, the interfaces must hook to a standardized central engine with a consistent user interface.

Of the big three micro vendors, only Lotus has recognized and addressed these issues so far. Microsoft Corp. has no product to speak of unless Access is considered, which is only a communications tool.

And Ashton-Tate's products depend on the vendors with whom it develops agreements. Even with these agreements in place, specific steps must be tak-

en outside of the microcomputer environment, such as logging on, starting the mainframe products needed, performing the extraction and downloading the results.

Even where some of this process is automated by the mainframe vendor, there is still either a significant learning curve or the need for extensive and continuing DP support for the mainframe product procedures because the process is driven from the mainframe end.

By contrast, Lotus's approach permits the kind of seamless interface best suited to end-user computing.

Alternative strategies

Outside of the big three, the strategy depends on using someone else's product or developing an import facility.

To date, several other vendors have opted to work with Lotus, and a number of interfaces are said to be under development at this time.

Microrim's new release of R:base System V, which includes support for T-A-C, is a good example of this.

In a shop where T-A-C is used, creating an environment that supports it permits continuing end-user access from within R:base itself. The menuing aspects of T-A-C permit development of new queries without DP involvement once interfaces to the necessary files have been created.

There are also micro-oriented connectivity products that are not vendor specific.

Answer Systems, a division of Sterling Software, Inc., offers a product line that includes a general product called Micro/Answer and some tailored versions, including Lotus Answer and Dbase Answer.

The strategy that Answer Systems has pursued is one of developing relationships with micro vendors, notably Lotus and Ashton-Tate.

Formal agreements with these firms have resulted in the ability to create files in the necessary format directly, rather than requiring import processing or reformatting at the microcomputer end.

Extensive development of Application Program Interfaces allows processing efficiency to be addressed. Answer Systems' products, for example, generally submit batch jobs on the mainframe, freeing up links and the micro resources.

The issue of a seamless interface, a key strength of Lotus's T-A-C, for example, is also addressed by Answer Systems' products. All requests result in the creation of batch jobs for which IBM JCL is automatically generated. Submission then takes place without direct user involvement.

OPEN architecture is what makes seamlessness possible. Technology exchange has contributed to a growing ease of use in today's products.

Answer Systems' product line was recently enhanced with the introduction of Answer/Link, one of several licensed implementations of Tempus-Link from Micro Tempus, Inc.

Other vendors have offered Tempus-Link, including Pansophic Systems, Inc.

What Tempus-Link pioneered is the transparent use of mainframe storage as if it were another disk on the PC, a technology known as virtual floppy disks. This approach facilitates the creation of files specifically for PC users by mainframe production jobs. These jobs can perform extractions and create files as part of the normal overnight batch stream.

By centralizing the location of commonly used production data extracts, the load on the system can be minimized through the provision of a common resource for micro users.

Tempus-Link continues to be a major and viable product in its own right; there were more than 1,800 installations in mid-1986. Tempus-Link's architecture pioneered the use of servers on the mainframe and requestors at the workstation. This was a model echoed by IBM's ECF, a product

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Connection

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introduced in mid-1986. IBM's Server Requestor Program Interface (SRPI) operates in a similar fashion.

Lou Bubala, executive vice-president of Innovative Computer Products, Inc. in Indianapolis, the U.S. distributors of Micro Tempus products, points out that Tempus-Access's Host Application Program Interface (HAPI), an extension of the existing Tempus-Access module, has been "validated even more strongly by IBM's recent connectivity announcements. What IBM is doing with SRPI," he says, "is virtually identical to what our HAPIs have been doing all along."

In mid-1986, Micro Tempus added a new product, Tempus-Access, which directly addresses the seamlessness issue. Tempus-Access is itself a licensed product, Dyl-270 from Dylakor, a division of none other than Sterling Software.

Transparency and seamlessness

These relationships are Byzantine, to be sure, but they make a very significant point: Open architecture is what makes seamlessness possible. Technology exchange by vendors has contributed to a growing ease of use in today's products.

Tempus-Access provides menu access to mainframe data, allows job submission, writes data out to Tempus-Link virtual floppy disks and may be invoked as a memory-resident program on the micro. A major weakness is that it does not create files immediately usable by micro applications, such as Lotus' .WKS or Dbase's .DBF. However, this is not necessarily a serious problem.

The creation of a .WKS or .DBF file on the mainframe is certainly a provocative issue, and it pays real benefits in ease of use at the micro end, but it is not an unalloyed blessing. In fact, the addition of all that overhead to micro file formats creates a much larger file and hence vastly increases the amount of time necessary to transfer data, even via coaxial connections.

The architecture used by Lotus for T-A-C, including a minimal transfer data base describing the data in a few records at the top, looks much more attractive in this light, given that T-A-C handles the importation transparently by reading the transfer data base and processing the data automatically on the micro.

It would not be appropriate to move on to the mainframe-oriented packages without discussing a major development in the communications area. Although it does not fit into the model of a complete link product (see story page S2), the Irmalan product from Digital Communications Associates, Inc. (DCA) is highly significant for a number of reasons.

Let us define our terms here. Of the three pieces addressed in the functional model, Irmalan concerns itself only with the middle block — the actual communications link. The significance of Irmalan is not that it does a better job of providing connectivity but that it provides a connectivity solution to a whole department by hooking a LAN to the mainframe. This is generally referred to as a gateway, and it is certainly not new with DCA's introduction of Irmalan.

However, at the time of the product's introduction, there were more than 300,000 Irma boards installed. That does not include the installations using products from Forte Communications, Inc., which was acquired by DCA in 1986. That volume itself is significant, because what this is is a standard interface, something that users have grown accustomed to.

Irmalan leverages that familiarity, permitting the same interface to be available to LAN users simply by installing hardware in one personal computer — which need not be the file server — and installing software in whichever workstations need mainframe access up to the limits of the board. If users need more sessions, they install another board. It is that simple, providing there are the requisite mainframe lines and ports available.

To its credit, DCA recognized that, to adequately differentiate the product, it needed more than just another pretty interface. The company included as an option the well-developed Forte Communications graphics capabilities, creating a true workstation product with capabilities far beyond those of IBM's 3279-type terminals.

For example, if you are using a 3279 terminal and want to recall an SAS Institute, Inc., SAS/Graph image you have to run SAS again, with all its attendant CPU use — not an easy or inexpensive way of doing things. On the Irmalan All Points Addressable workstation, however, you can store and redisplay the image without even logging on.

Another development on the DCA front is its recent acquisition of Microstuf, Inc., which created Crosstalk, long a dominant asynchronous communications product. Although no information is currently available concerning DCA's possible plans for cross-fertilization, one can certainly speculate that it may be looking to forestall the approach of another company, Simware, Inc. Simware's new Sim/Xfer product supports Irma boards as well as modems, permitting an organization to have a consistent interface for both asynchronous and hard-wired PCs.

VM Personal Computing, Inc. in Danbury, Conn., has recently provided terminal emulation board support with its Relay Gold product for similar reasons.

What all this points out is that communications vendors have realized the value of a consistent interface just as the applications software vendors have.

To the degree that software runs on

these various communications products transparently, as, for example, T-A-C and Linkware Corp.'s Linkware do, the user is spared yet another set of commands to learn.

No vendor of full micro-to-mainframe data access and reformatting capabilities wants to force customers to revamp their communications strategy just to use its product.

The mainframe side

The mainframe-oriented products may also be looked at from the point of view of vendor-specific vs. generic. The issues for vendor-specific products in the micro and mainframe spheres are similar with two exceptions.

First, there is a major divergence in approaches to the desktop, and second, while the micro products concentrate on providing direct access to a number of mainframe architectures, the mainframe vendors try to create one or two general formats on the micro end and rely on the micro packages to take it from there.

The problem with this approach is that unless the vendor has its own micro analysis products integrated with the overall scheme, as Information Builders and Cullinet Software, Inc. do, the user is forced to take additional steps to get out of the link product, start the micro package and import the data before finally beginning to do some work.

By the same token, a user may not wish to be tied to using Cullinet's Goldengate spreadsheet component after learning Lotus's 1-2-3, for example, especially if a large number of analyses have already been developed using the latter. This was a factor in Cullinet's release of Infogate, which allows the user to integrate the micro package of choice into the scheme and keep it under the control of a workstation manager.

For several years, Information Builders has had a complete micro implementation of its mainframe product in PC/Focus and in recent years has added a spreadsheet of its own. There are limits to the product's capabilities on the PC, but they are imposed by hardware and operating system constraints, which may soon be lifted.

Vern Sheidler, director of marketing at Information Builders, says, "We're very excited about the new hardware coming in. The Compaq 386, for example, runs PC Focus three times faster than an AT, and we're still using the same operating system."

Vendors are coming to market with complete implementations or near clones, like Applied Data Research, Inc.'s Ideal Escort or D&B Computing Services, Inc.'s PC Nomad.

The goal of these products is to permit not only communica-

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ASK THE VENDOR

The following questions were solicited from users and conveyed to the vendors for responses.

Will a future release of Omnilink support direct interfaces to custom-designed, closed personal computer applications so users can upload or download data automatically without having to go into Omnilink?

Allen Banick
Systems analyst
Cedar Sinai Medical Center
Los Angeles

ON-LINE SOFTWARE INTERNATIONAL, INC.: It is our intention to incorporate into a future release of Omnilink a powerful generic Application Program Interface. This interface will allow a user-written application program on the PC to invoke most of Omnilink's host functions. The user program could be written using any of the most common PC languages. For users not wishing to code a program, a powerful script language will be provided.

In addition to controlling Omnilink functions, this Application Program Interface will allow user programs to interact with any other mainframe system. The PC program will have direct interaction with mainframe screen images. No changes to the user programs will be necessary to support different communications boards.

What are VM Personal Computing's plans regarding a network version of Relay Gold? Would such a version allow users to get IBM 3270 screen services without requiring that each personal computer have its own 3270 emulation card? Could users receive Relay error-corrected file transfers?

Rick Hoffman
Senior programmer/analyst
Data Resources, Inc.
Lexington, Mass.

VM PERSONAL COMPUTING, INC.: A network version of Relay Gold will be available this June. Our mainframe software, Relay/3270, allows PCs running Relay Gold to emulate a 3270 terminal without any emulation boards at all. So each PC on a network running Relay Gold will be able to do 3270 emulation without a 3270 emulation board if it is connected to a mainframe running Relay/3270.

We are in the process of developing a mainframe program that will make this hardware-free 3270 emulation possible for Relay Gold PCs connected to MVS/TSO mainframes. Error-free file transfer will also still be possible when connected to mainframes running Relay/3270, Relay/VM and Relay/TSO. You can do this error-free transfer through 3270 emulation boards and protocol converters as well.

How soon will Linkware give IBM Personal Computer users full Digital Equipment Corp. VT240 emulation in 132-column mode with DEC Regis graphics?

Steve Gokorsch
Manager of end-user services
General Electric Lighting Business Group
Cleveland

LINKWARE CORP.: Linkware is now beta-testing full DEC VT220 terminal emulation. Initially, Linkware VT220 terminal emulation will display 132 columns on 80-column screens using horizontal scrolling or 132-column screens that use the Tseng Laboratories, Inc. video display board. Availability is slated for the second quarter.

Full VT240 graphics terminal emulation, including 132-column and Regis graphics support, is under development and planned for third-quarter release. Linkware VT240 terminal emulation will support the IBM Enhanced Graphics Adapter and Tseng display hardware. Market demand will dictate support for other boards.

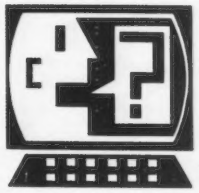
We'd like to stress that these are our current plans and not commitments to product releases, as we have not formally announced either product.

When can we expect Tangram to take advantage of the expanded memories available in personal computers? Does Tangram have plans to make Arbiter compatible with Microsoft Corp. Windows? And are there any plans to offer a program generator that would allow users to build their own LU6.2 applications?

Roland Ebright
Manager, technical services
Scientific Atlanta, Inc.
Atlanta

TANGRAM SYSTEMS CORP.: The PC component of Arbiter requires less than 32K bytes of resident memory for most connectivity options. Since the majority of this memory usage is for executable code, it is not advisable to migrate Arbiter into expanded memory. However, Arbiter allows the user to allocate segments of memory as a cache for data being transmitted between the host and PC. This cache is a candidate and will be migrated to expanded memory in a future maintenance release of Arbiter.

In Arbiter's PC component, the menu and control functions are bound together. We are currently reorganizing this component to segregate these functions. When accomplished, users can integrate Arbiter into Windows or IBM Topview applications. Tangram is currently soliciting customer dialogue to determine the degree of integration into these products that is needed. The reorganization is scheduled for completion by April.



We will release PC and host application program interfaces (API) to several beta-test sites by April. These APIs will allow host applications running under IBM CICS and PC programs to communicate on a peer-to-peer basis via Arbiter's LU6.2 interface. Arbiter will provide peer-to-peer functions even for PCs using asynchronous and IBM 3270 emulation — coax or IBM Synchronous Data Link Control — connectivity options. We anticipate production availability during the second quarter.

Can we expect a universal terminal emulator product for the IBM Personal Computer family of workstations to provide direct IBM Systems Network Architecture, asynchronous and local-area network (LAN) interconnect capability for IBM 3278 and 3279 — meaning seven-color, full-graphics — emulation, and will it also support a similar connection to Digital Equipment Corp. hosts?

Marty Goldberg
Senior systems analyst
Chevron Information Technology Co.
San Ramon, Calif.

SIMWARE, INC.: It is one of Simware's goals to provide universality in its approach to PC-mainframe integration. This goal includes all of the features mentioned in your question.

Simware currently provides full-featured support for both coaxial and asynchronous communications in SIM 3278/PC, in combination with its sister product, Sim/Xfer.

LAN interconnect is of particular strategic interest to Simware. Research is under way for this aspect of connectivity.

Simware is committed to providing extended color, and development is under way. Some Simware employees are currently using prototype software that provides seven-color support through a coax connection.

SIM PC has DEC VT100 emulation as a feature in its current release. We plan to significantly enhance SIM PC's support for non-IBM hosts to allow users full functionality.

Allegheny International is in the process of installing a number of Digital Equipment Corp. VAXs both at its headquarters and at member companies. What plans does OBS have for creating a VAX version of Excellink to facilitate micro-to-mainframe file transfer?

John Petrush
Microsystems analyst
Allegheny International, Inc.
Pittsburgh

OBS SOFTWARE: OBS has been studying the impact of DEC VAX support in both our software products and remote computing service businesses. While our just-released Version 3.2 of Excellink is focused on improvements for the IBM user, we are considering DEC VT100 emulation and a suitable file transfer protocol for the DEC environment for our next Excellink release.

Does Innovative have plans to release a version of Tempus-Access that will interface with Adabas and Natural from Software AG of North America, Inc.?

Jeff Sorensen
State of South Dakota

INNOVATIVE COMPUTER PRODUCTS: Tempus-Access, developed by Micro Tempus, Inc., has been designed to support a wide variety of data bases commonly found in the corporate environment.

Tempus-Access uses two methods for this compatibility: direct reads to files and data bases and call facilities to data bases that support direct calls.

Currently, Tempus-Access offers direct read interfaces to sequential, ISAM, BDAM and VSAM files as well as to IBM's IMS, DL1 and Cullinet Software, Inc.'s IDMS and IDMS/R as optional product features.

Tempus-Access provides both a call and user exit facility for user routines to interface with most other data bases such as Adabas, Natural, Applied Data Research, Inc.'s Datacom/DB, Total and others that support these calls.

The future direction is to create direct interfaces with data bases that are in line with market demand such as IBM's DB2. •

VENDOR VIEWPOINT
Link politics and the art of compromise

BY JACK RODGERS

Micro-to-mainframe departmental politics is a three-party system involving MIS applications management, end users and MIS communications. Companies face common political problems and obstacles evaluating, selecting and implementing a micro-to-mainframe link.

A successful integration of personal computers into the mainframe environment must take into consideration interdepartmental needs and the balance of power. Political problems can be overcome or avoided completely if a company takes the right approach.

In most areas of corporate game playing, the well-known and generally accepted rules of the game provide guidelines to resolve conflicts. However, the micro-to-mainframe link game is new, and as yet, it has no rules.

The first step in building the right approach to micro-to-mainframe link integration is to understand the special interests of each party involved. MIS applications management wants to minimize the impact of the link on system response time. The extent of that impact depends on how large the files are and how often they are transferred as well as how many users are on the system at one time. But even if the initial work load is acceptable, link usage tends to grow over time.

End users are application oriented. To them, important issues are ease of use, speed and functionality. End-user departments may have significantly different needs, however, as well as different definitions for those terms. MIS communications is a support function to MIS applications management, but the micro-to-mainframe link issue introduces a new element into the political arena.

MIS communications plays a dominant role in the link process: It becomes judge, jury and traffic cop between MIS applications management and end users. Since the link must be compatible with the existing and planned network hardware and software, MIS communications is concerned with issues such as the number of asynchronous ports, dial-up vs. local communications and protocol converters designed for finger speed, not line speed.

Rodgers has 16 years experience in MIS management and applications development. He is director of marketing for OBS Software, a division of On-Line Business Systems, Inc. in San Francisco.

End users may not understand data communications, and MIS applications management may not be fully aware of the limits of the network, but MIS communications has to understand them both.

Satisfying the needs of each party is not a problem. The conflict arises when the needs of one party are sacrificed to meet the needs of another. Further, the needs do not even stay the same; — this is a moving-target problem. During the typical requirement of six months to a year for micro-to-mainframe link integration, the environment evolves, and conflict evolves with it.

Not only does the communications network change, but personnel changes also. In some cases, the responsibility for the link switches from one player to another.

> IN THE three-party micro-to-mainframe link political system, interdepartmental needs must be acknowledged and a balance of power maintained.

The evaluation phase, in which reviewers screen products to select a few of them for further consideration, is chancy when delegated to an inexperienced user. A negative or prolonged evaluation may result because the user cannot get the micro-to-mainframe link to work. The link might be erroneously dropped before MIS becomes involved, thereby unintentionally avoiding conflict before it begins.

The political climate can really heat up, however, when MIS does not involve end users in evaluation and selection at all.

MIS may do this either because users do not have time or because these tasks are perceived to be MIS functions. A common failing here is neglecting to stress-test the micro-to-mainframe link to consider the end-user volume demand. If the link performs well during testing but bogs down in production, it is too late to avoid a finger-pointing conflict. Either the link is replaced or the use of the existing link is restricted.

How severe this restriction on use can be is illustrated by a Houston oil company. The company, currently seeking a replacement for its CICS-based micro-to-mainframe link, specified this policy: The link cannot be used in production until after 10 pm.

The potential for conflict is greatly increased if a company uses different hardware vendors at different levels.

At one large packaged goods company based in Cincinnati, MIS favored the use of IBM products, which was a standard in the MIS department. End-user departments had Apple Computer, Inc. machines and Digital Research, Inc. CP/M-based computers. The conflict arose because MIS and end users had not agreed upon a standard for the company.

In this case, the link selected supported all three types of computers, but subsequent enhancements for the Apple and CP/M machines had to be limited.

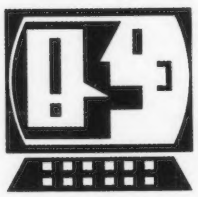
And now, a new conflict rages about micro-to-mainframe link support of IBM vs. non-IBM mainframes. The recent news of Intel Corp. 80386-based IBM microcomputers, incompatible with current IBM Personal Computers, indicates hardware standards will be a continuing source of conflict.

Not only MIS and end users need to be satisfied. MIS communications also has to determine which micro-to-mainframe link solutions are feasible, given the communications network. In all of the above examples, feasible micro-to-mainframe link solutions that could be supported by the communications network were not practical.

In another situation, MIS communications for a Southern California aerospace company required that the link support a specific IBM protocol converter and run transparently on an Ungermann-Bass, Inc. local-area network. Any product that did not meet these communications criteria could not even be considered, regardless of the needs expressed by the other parties.

The conflict was resolved when the end users accepted the limitations of the data communications network.

MIS communications is in direct conflict with end users on the use of autologon scripts. The script feature of micro-to-mainframe links enables end users to complete complex communications and transfers with a simple — sometimes even a one-key — interface. However, using these features means revamping the way that the mainframe network logon process is managed, because the frequent changes that MIS communications often makes in logon procedures would invalidate autologon scripts.



Because the benefits of an autologon are significant and the job of network maintenance is not made impossible — it is only made more difficult — MIS communications usually loses this battle.

Micro-to-mainframe link implementation typically begins with the purchase of a minimum configuration. In a successful integration, the link usually expands and the company purchases a site license. If the needs of each party are not met, however, the link stagnates and is eventually replaced.

Another common cause for stagnation is the hands-in-pocket standoff that occurs when payment is mentioned. The real problems do not occur at the outset, when end users usually pay if the link is primarily a micro link or when MIS pays if the link resides on a mainframe. It is when use of this technology is going to spread, though, that rules must be in place to govern how the additional usage is financed.

Three-way communication

In the three-party micro-to-mainframe link political system, interdepartmental needs must be acknowledged and a balance of power maintained for successful integration. If one party dominates, the wrong link may be elected.

MIS communications plays a well-defined technical veto role but should not otherwise bias the decision. If MIS applications management dominates in the evaluation and selection phases, problems may surface during implementation. If MIS passively accepts the link selection as a service bureau, the result may be less than optimal, however, since vocal end users may satisfy their needs at the expense of other end users or the MIS applications group. Even the best intentioned end users, left completely to their own devices, might select something that meets today's needs but not tomorrow's.

A regional telephone operating company provides an example of what can result from an unbalanced selection process. In this company, the MIS group wound up purchasing a second link product to replace one selected and used by the information center but which was disliked by a coalition of MIS and some end users. The information center, at first reluctant, eventually accepted the new link after a six-month learning and adaptation period.

The task force has been found to be the most successful approach to micro-to-mainframe integration. Representatives from each party form a steering committee to inventory the needs requirements. This inventory evolves into a request for proposal (RFP) for vendors. The coequal committee structure maintains a balance of power. The RFP guarantees that the interdepartmental needs are addressed.

A New England state agency recently used the task force approach in a successful micro-to-mainframe integration. The needs and priorities of every party formed the foundation for a comprehensive RFP issued to vendors nationwide.

But having an RFP does not guarantee that the link chosen will satisfy all needs specified in the RFP. In this case, when the selected link was OBS Software's Excellink product, it did not support all of the required communications hardware. Nor did it satisfy the needs of the end-user departments. OBS had to enhance the product within a specified time frame to meet all the RFP conditions.

The right approach only provides a good start. Micro-to-mainframe integration must be dynamic: It must evolve over time as the environment and needs within the company evolve.

Link technology is composed of different evolving components: file transfer, data management, security, data transformation and network topologies. No one product can provide the flexibility and functionality required in all those areas on a long-term basis yet, since every change creates the potential for new interdepartmental conflicts.

Micro-to-mainframe integration must be constructed on a central open-architecture product that integrates the component technologies. In this way, flexibility and functionality can be maintained over time to successfully deal with moving-target political problems. •

Connection

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tions and data exchange, but also applications development. Projects can be developed and tested on the micro without tying up mainframe resources at all. The links help prevent duplication of existing modules and can also aid in the creation of test data by subsetting real data and downloading it for simulations.

Even more interesting is the possibility of creating shared processing applications. Local validations and edit checks can precede upload, and download results can determine the direction of continued operations. Still, we are a step or two away just yet.

Another approach, and one that makes no bones about its mainframe orientation, is that of using micros purely as workstations and not as stand-alone development sites. Some examples of this are Software AG of North America, Inc.'s Natural Connection and the Ramis PC Workstation from On-Line Software International.

The latter is not a micro version of Ramis; programs do not run in it, but they may be developed, and queries designed and performed via the mainframe link, with results being downloaded to other packages. All this occurs under the control of a workstation manager that handles menus and the links.

The workstation manager, originally developed separately, has recently been bundled into a cohesive and integrated whole by On-Line Software. In this configuration, it is far more attractive than the Focus link facility, which supports asynchronous communications by presenting the user with a blank screen and waiting for commands to be entered in the modem's command language.

This should not be construed as a fatal flaw on the part of PC/Focus or Focus Data Connection, although it is annoying. More to the point for Focus product users is the huge array of available interfaces to other data structures. IBM's IMS, DB2 and competing vendors' products such as Software AG's Adabas or IDMS, VSAM — can all be read with Focus.

In fact, now that the product runs on DEC equipment and the micro product supports DEC's VT100, it could actually be used as a bridge between IBM and DEC, since the mainframe product is available on both.

It is precisely this flexibility that generic vendors seek to achieve, but this particular vendor-specific product has more interfaces than any of them.

All of this makes it fairly obvious why Information Builders would bring the Focus Data Connection to market. The completeness of the Focus report writer — it is widely perceived as one of the best of its kind — the large number of available interfaces, the ability to join dissimilar file architectures together for reporting purposes, coupled with a menu-driven front end make this an attractive option for shops that do not need the full Focus product.

Based on interviews with Information Builders management, one can expect significant enhancements to the user interface soon. For example, a scripting facility, which remains a major omission, is slated to be released soon.

Competition in the mainframe-oriented market is likely to be between Information Builders and the generic link vendor. No number of features is going to sell a vendor-specific product to a shop that has multiple products with data to access. That shop could, to be sure, purchase all of the proprietary products, and in the absence of general solutions, some have done just that.

But this solution is no solution at all, because it requires the development of a whole host of specialists. As for the rare shops with only one or two mainframe products to support, they are probably considered only a secondary market to these vendors, and if they stay with their vendor's like product, they will most likely get what they need.

IBM is a special case. It obviously loves link products, since it has so many of them. The industry will probably wait a long time for any kind of general solution in this area from Big Blue.

There are a number of interesting products to consider: Linkware, a subsidiary of Ungermann-Bass, Inc.; Arbiter from Tangram Systems Corp.; and Excellink and VDAM from OBS Software. However, the fact is that these products do not constitute total solutions to the issues discussed here. Each falls short of the primary goal of accessing the data needed on the mainframe and extracting just what is desired.

Combinations of strength

One interesting approach, however, is the combination of two products, Linkware and Carleton Corp.'s CQS-Infotec. Linkware, a premier communications package, can provide an outstanding communications environment. Data transfer among dissimilar host environments, such as DEC, MVS, VM and Unix, is possible through commonly used protocols, including asynchronous and X.25 as well as IBM's Systems Network Architecture (SNA).

A nice touch is minicomputer support, an issue we have not discussed here, but one that is highly significant in many large organizations in which minis, more than LANs, are used as departmental solutions.

The Linkware PC interface is attractive and very well organized. Data transformations available include direct .WKS conversions and others, and the scripting allows the development of the seamless applications we have alluded to. What is missing in this product are extensive mainframe data access capabilities. Enter Carleton with a copy of CQS-Infotec in hand. The previously missing functionality is here, with direct access to VSAM, ISAM, Adabas, IDMS and others.

Carleton has no ownership relationship with Ungermann-Bass, parent of Linkware, but there is a certain amount of joint marketing. The two products are well integrated and provide a mix of features that would qualify not only as a complete connectivity product, but as an ultra-high-performance one, especially with Linkware's new VTAM-resident version.

Optimized communications

The optimization of the communications link is an area that has received increasingly more attention in the last year with the introduction of faster modems, VTAM-resident links and the like. Driven by increasingly large demands on their systems as well as greater volumes of data per download as the applications themselves become more sophisticated, companies have begun to look for optimal communications products.

Continued on next page

Connection

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One example of these is Arbiter from Tangram, a firm formed by some former SAS personnel with a great deal of SNA sophistication. Arbiter is a VTAM-resident application; that is, it bypasses the telecommunications monitor such as TSO or CICS. This strategy improves efficiency by removing a layer of overhead.

It is important to note, however, that the performance benefits of Arbiter do not become apparent for the first few users. A user of TSO gets a certain amount of memory for a working set, and Arbiter uses more than that. Subsequent TSO users get just as much, however, while the Arbiter increment is fairly small. The crossover comes at four or five simultaneous sessions. At that point, Arbiter begins to show its advantages.

Even more interesting is Arbiter's capability of differentiating among the devices to which it interfaces. Instead of simply seeing a 3270 device, Arbiter knows it is looking at an IBM Personal Computer XT, at which level of DOS it is running, how many megabytes of storage it has and so on.

This is a useful management tool in terms of resource reporting, and it also has implications with respect to optimizing the link, since the device drivers are different for dissimilar devices and can take advantage of a particular machine's capabilities.

And, of course, with LU6.2 in place, the ability to pass this kind of information back and forth could be used in a variety of interesting ways.

Michael Camp, president of Tangram, says, "It has become obvious to some of the major micro software vendors that they can use the intelligence of the PC for more than file reformatting and directly accessing the host. There is a need to put in layering or messaging software that will allow a user on a PC to kick off tasks which may run on a host or a LAN. The messaging software could more or less act as a traffic cop to receive and distribute the messages, which could be as simple as, 'The batch job is finished' or as complex as reformatting a file."

Background task functions will be able to integrate with Advanced-Program-to-Program Communications (APPC), an early IBM implementation of LU6.2, as if the protocol were brick and mortar, thus providing functionality that APPC promises but cannot itself deliver.

In the current release of the product, for example, Arbiter can be used to multitask on the mainframe: Users can begin an Arbiter session, start a download, then begin a TSO session from the same PC workstation while the download proceeds.

The future

In the next two years or so, there are likely to be more developments than can possibly be covered here. There are, however, some key areas to watch.

First, there is the continuing evolution of SNA. IBM, of course, wants to keep SNA as the standard for the whole computing community, but there is a competing standard in Open Systems Interconnect (OSI) that may make for some interesting moments.

For example, in principle, Linkware could serve as a bridge between systems running the two environments, although that is not possible today. Linkware's parent company, Ungermann-Bass, has been heavily involved in some of the efforts to promulgate the OSI standard.

The link and application vendors are beginning to butt against some issues that are fundamental to SNA. For example, Information Builders' Sheidler says, "We're all dealing with the dawning realization that the PC is replacing the 3270 terminal. The possibilities of enhancements to user interfaces are huge. In the future, the way that mainframe cycles are used will be very different."

There is a deeper truth here. As discussed above, buzzwords like LU6.2, PU2.1 and APPC are only a piece of the picture. John Crocker, executive vice-president of On-Line Software, points out that "LU6.2 is only a tool. Extensive development must be

devoted to ensuring that the micro end is intelligent enough to handle its duties."

The implications of all this are very interesting. First, expect the vendors to remain poised until IBM lets the other shoe drop and gives some idea of how APPC services and the SRPI will be provided and supported. The required degree of sophistication virtually ensures that no vendor will bring anything to market that might be obsoleted by the full specification of operating system services that are available.

The possibility of allowing users to create their own unique cooperative processing environments is already in the cards, according to Tangram's Camp. "Customers want to build applications where the PCs provide presentation services and contextual editing," he says, "for example, policy processing for insurance companies. We currently have a client who used to use the typical approach: present all transactions to CICS for editing, validation, computation and updates. Using Arbiter, the PC does presentation services and makes conditional decisions for processing [contextual editing], such as prompting for spouse's name if the form indicates 'married' but that field is not filled in."

THE GROWTH of distributed processing will not only continue but should take a quantum leap with the availability of these tools.

It is safe to predict that the growth of distributed processing will not only continue apace, but should take a quantum leap with the availability of these tools and others like them. Consider that a Focus user today could design a true shared processing application, except for the fact that no ongoing communications can proceed in both directions. While a line can exist between devices, the connection is half-duplex. Until true program-to-program communications arrives, any distributed architecture is too specific to the particular job to represent a real trend.

Nevertheless, serious work on distributed processing has been done by Relational Technology, vendors of Ingres, and Oracle Corp. vendors of Oracle and others. In addition, Cullinet Software is working on a distributed version of IDMS. As services become available to handle dissimilar architectures transparently, it no longer will matter that a network includes a LAN in Chicago, a 9370 in Detroit and 1,000 salesmen in the field, all of whom rely on the central information server machine for the data they need.

Jack Armstrong, Cullinet product marketing manager, information center products, has said on several occasions that Cullinet believes this kind of information resource, centrally stored and managed and serving diverse needs within a large organization, is the architecture of the future, regardless of whether the departmental solution is a LAN or supermicro/small mainframe hardware. For this vision to become reality, the continuing evolution of connectivity will be critical.

Information Builders' Shiedler acknowledges this and notes, "We have established a formal group on connectivity, and we expect to devote considerable resources to it."

This brings us to this question: Is connectivity just another buzzword or does it represent a new level of functionality?

I believe the latter is true, and in fact, the micro-to-mainframe issue as it is understood today will not even be an issue two years from now, having been subsumed into the larger concerns of connectivity and the workstation data link (see story page S2).

In a true connectivity environment, even a scenario as outrageous as the following could be functional. A file server that is on a LAN that is connected to a departmental processor connected to a mainframe could provide data to a remote workstation asynchronously communicating with another mainframe

Continued on page S19

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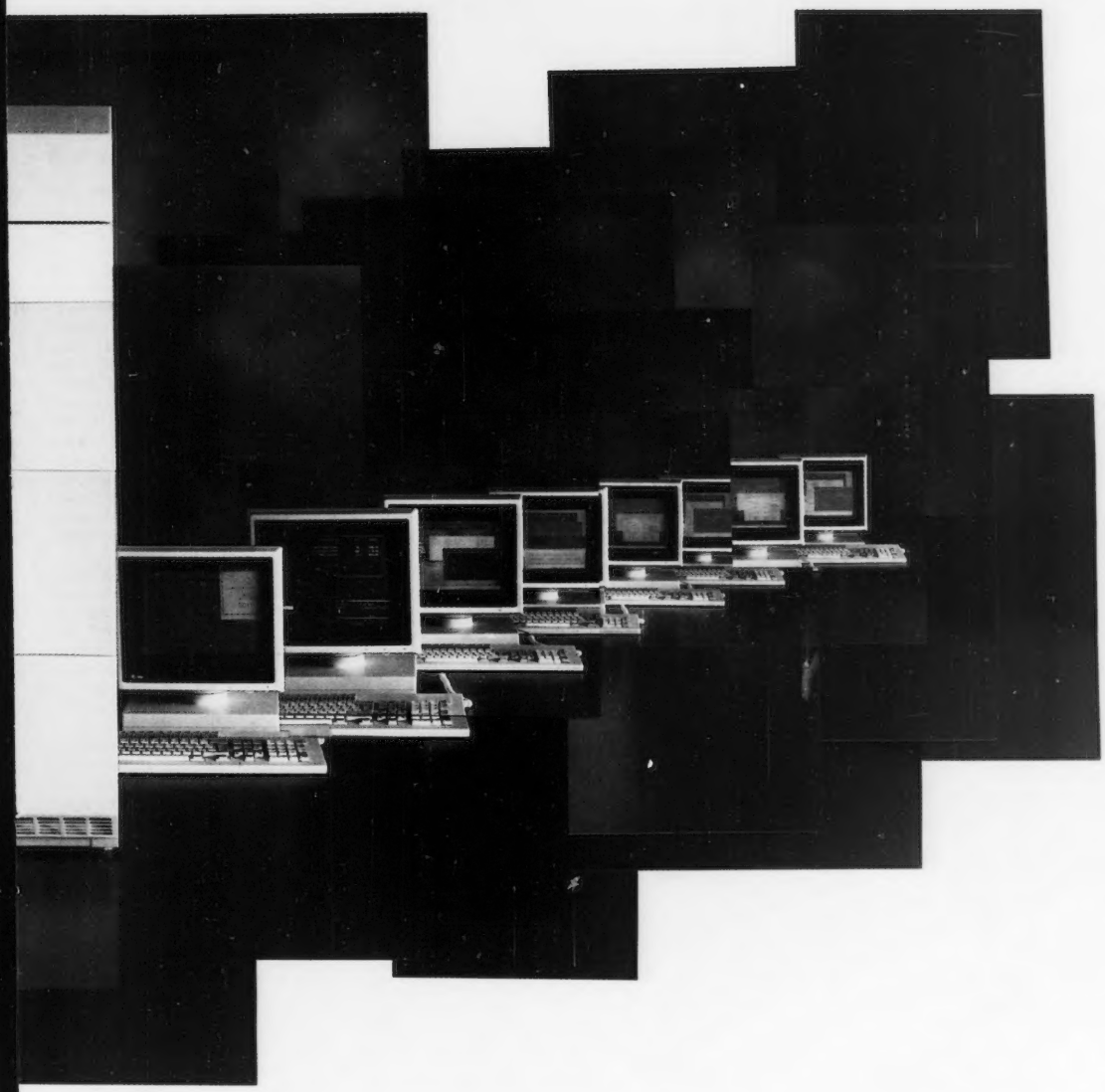

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Sketches of distributed DBMS

BY STEVE FELDMAN

To create a micro-to-mainframe masterpiece, start with a heterogeneous distributed data base management system that spans multiple systems and operates against a range of data base products and file structures. Then give microcomputer users a single relational view of all data stored over the entire computer network.

Make sure this view is transparent so users can query the system without knowing how or where the data is stored, even if information requested is on multiple remote data bases.

Now, add extremely high levels of coordination between data bases residing on individual nodes so the entire system functions with global data integrity, concurrency and recovery. This picture includes support of a two-phase commit and rollback protocol to permit synchronized updating of transactions at multiple sites.

The final touch that is needed is performance optimization so queries are processed in the most efficient manner across the DBMS network.

Compared with this ideal, today's distributed data base management technology seems very crude. Recent releases of the much-ballyhooed Ingres and Oracle products are really no more than preliminary steps.

The industry will probably have to wait at least two years before IBM unveils a networked DBMS, analysts project.

Meanwhile, Oracle Corp. in Belmont, Calif., with its SQL*Star and Relational Technology, Inc. (RTI) in Alameda, Calif., with its Ingres/Star, represent the state of the art in distributed IBM SQL-based DBMS.

Observers point out, however, that the first releases of these products lack extensive system support, provide multisite querying but no multisite update capabilities — an extremely complex chore — and remain untested in performance and integrity.

"Distributed DBMS is totally uncharted waters, and nobody really understands the implications for data base integrity, file recovery and restart recovery," says Michael Braude, vice-president of software research at Gartner Group, Inc. in Stamford, Conn.

"It took IBM eight years to put backup disk recovery for IMS into place just between two processors on a floor. Now you're talking about any number of processors with their own data — not even on the same disk. Just in terms of the file and data integration mechanisms that must be put in place, the problem is awesome," Braude says.

Today's heterogeneous distributed DBMS products support a distributed read (query) environment but not a distributed write (update) environment. "Recovery and update mode must be local with the current products," says James Davey, senior research associate at Digital Consulting, Inc. "Vendors don't offer a distributed data base with full location and replication transparency," he says.

Updating

Nevertheless, many, if not most, applications required by today's users can be satisfied with a networked DBMS that permits updating at a single data base site, Davey notes.

Yankee Group analyst Nina Lytton points to the tremendous challenge of efficiently balancing performance in distributed DBMS networks.

"You're not only dealing with searching algorithms but also complex network tracking issues," she says.

Lytton credits Tandem Computers, Inc. as being the first vendor to deliver highly functional distributed DBMS, which evolved as an integral part of Tandem's fault-tolerant architecture. Tandem partitions data

Feldman is a technology writer, based in Boston.

into mutually exclusive but collectively exhaustive data base subsets distributed across a network. "That means there is no duplication of data between subsets, which together give a sum total of the data base," Lytton explains. "A user can grow his data base in size just by adding another node."

Oracle and RTI take exception to the picture observers paint of distributed DBMS technology. For example, Oracle points out the following:

- SQL*Star's current support of IBM VM/CMS hosts, Digital Equipment Corp. VAX/VMS, Unix and IBM's PC-DOS satisfies a major portion of the market.
- Oracle's support for a two-phase commit protocol for multisite updating is due this year, along with additional interfaces to non-Oracle products such as IBM's DB2 and ISAM.
- Tandem's distributed DBMS, while homogeneous, demonstrates that data integrity can be preserved in multiupdate environments.

> "NOBODY really understands the implications for data base integrity, file recovery and restart recovery."
>
> MICHAEL BRAUDE
> GARTNER GROUP, INC.

- Academic research and IBM's R* project provide an enormous body of work addressing data integrity and recovery. "Although this has not been implemented and shipped commercially, we have a good understanding of these issues," says Ken Cohen, Oracle's product marketing director.

Oracle emphasizes that SQL*Star is an open system that "faithfully" adheres to IBM's R* specifications.

"We believe the more uncharted course is in administrative procedures," Cohen says, "which will be needed to manage distributed DBMS."

Oracle points out that its pace for delivering increased functionality meets or exceeds users' ability to absorb it. For example, by the time it delivers a two-phase commit protocol, the company says, customers will still be implementing applications for single-site updating.

Standardization on SQL will help drive the integration of mainframe and personal computer processing and simplify development of distributed applications. "Every hardware and software vendor is rushing to develop SQL data base systems," says RTI's Robert McCord, project manager for distributed technology. "This will make our job easier, since we will want to access as many of those SQL engines as possible. This will give us a nice, clean interface to work with."

RTI has formed a five-year partnership with Carnegie-Mellon University, which will be implementing Ingres/Star over its campuswide network. "We're putting all our eggs in the Ingres basket," says Tony Schaller, Carnegie-Mellon's manager of systems development. "We feel that distributed relational systems provide the most capabilities for both developers and querying by the client population. The key thing between the micro-mainframe link is management, and we now feel with our distributed DBMS we have the good software to do the management and handshaking."

RTI has just introduced Ingres on IBM Personal Computers. With this product, networked PC users can run Ingres applications locally that will process data residing on minis and mainframes in distributed configurations. As a bridge between micros and mini and mainframe data base systems, Ingres on a PC will allow users to access Ingres data from heterogeneous distributed systems and use that data within their popular PC packages such as Lotus Development Corp.'s 1-2-3.

In addition, Ingres can also run on PCs in stand-alone fashion. Ingres will enable PCs to act as full-function fourth-generation application development systems. Applications developed on PCs can be ported without change to run on minis and mainframes, according to the firm. •

Untangling the web of multiple-vendor linkage

An MIS acquaintance recently recounted a dream he'd had. In it, he said, a huge computer corporation seized control of the country, wresting power from the weakened reigns of a scandal-plagued president. As its first order of business, the new corporate ruler mandated that only his company's personal computers, mainframes, networking and data base management software would be used throughout the world.

I consoled the man for suffering through such a nightmare.

"What nightmare?" he responded. "They just solved my micro-to-mainframe problems."

It is true that MIS departments and information centers can only dream about a link strategy as simple as connecting systems from a single vendor. Reality is a nightmarish, tangled web stretching across multiple-vendor hosts, micros, minis, emulation boards, data bases, link software, local-area networks (LAN), private branch exchanges, public networks and leased lines.

There is some hope for order, however, as General Electric Co.'s Lighting Business Group in Cleveland discovered when it set about finding a way to connect approximately half of its 1,200 personal computers to both IBM VM and Digital Equipment Corp. VAX hosts. What GE discovered was software from Linkware Corp. in Waltham, Mass. Applications running on the hosts create summary data sets stored within Linkware's host-resident file servers — staging areas accessed by PCs running Linkware's user interface.

"I wanted a micro-mainframe link that looks exactly the same in the IBM world as it does in the DEC world," says GE's Steve Gokorsch, manager of end-user services. "We now have a single interface to train people on and support."

By installing Linkware, Gokorsch has been able to eliminate various link products previously in use, which, he says, "each worked a different way and were driving us crazy."

Support for sanity

Linkware, notable for its broad range of support spanning multiple-vendor hosts, PCs, local-area networks, asynchronous communications, IBM Systems Network Architecture and IBM 3270 protocol converters, was purchased last February by LAN supplier Ungermann-Bass, Inc., exemplifying the trend toward hardware and independent software vendors combining to address multivendor communications.

For example, with Linkware software, an IBM Personal Computer or Apple Computer, Inc. Macintosh user could employ a single menu-driven interface to access remote information on any combination of IBM MVS/VTAM, MVS/TSO, VM/CMS and System/38 hosts; DEC VAX/VMS computers; Hewlett-Packard Co. HP 3000 systems; and Unix machines. Other personal computers supported include the Wang Laboratories, Inc. Professional Computer, DEC's Rainbow and Decmate and Unisys Corp.'s B25.

Linkware President Wayne Benoit says large MIS departments are "tired of trying to support many different link products to deal with the problem."

By focusing on a single multivendor link, information centers will not only simplify training and support, but improve control of information, Benoit stresses.

> IT IS true that MIS departments and information centers can only dream about a link strategy as simple as connecting systems from a single vendor. Reality is a nightmarish, tangled web.

Convincing customers, however, to commit to a comprehensive strategy in today's cloudy and volatile market is difficult. The challenges Linkware faces in selling its broad link solution may shed light on the state of today's micro-to-mainframe marketplace.

Quarters of resistance

The first wall of resistance comes from a market that still underestimates the complexities of multivendor micro-to-mainframe communications — and thus, the workings of Linkware software, according to Linkware Marketing Director Norman Saunders. "People say, 'Why do you want to sell me $25,000 worth of file transfer when I can get Masscomp Co.'s Kermit for free and Microstuf, Inc.'s Crosstalk for a couple of hundred dollars?' "

Beyond file transfer, Linkware's modular architecture allows the software to do the following:

- Collect and organize summary production data in file servers running on hosts from multiple vendors.
- Transform data into the appropriate format of the recipient PC application or host.
- Provide session-layer control, data security, error-checking data integrity and backup.
- Supply PC users with a menu interface for automatic host logon, file transfer, data translation, Help and library services and a script language for automating terminal transactions.
- Provide tools for programmers to build distributed multiple-vendor applications. These applications render Linkware the communications glue between disparate computers and networks; programmers need little knowledge of communications functions.

However, Linkware does not provide data base extraction. A user's off-the-shelf or custom extraction facilities are used to place data tables in Linkware's host file servers.

For example, an information center could sandwich Linkware communications between Lotus Development Corp.'s generic The Application Connection — which provides extraction from a range of popular data bases — and a Lotus PC front end.

The less PC users see of Linkware the better. Artificial Intelligence Corp. (AIC) in Waltham, Mass., a Linkware OEM, adds value to its natural language extract capability by embedding Linkware into an offering that downloads results running on a PC. "The end user never sees us," says Linkware Product Support Director John Burns. "But we're providing the network support, the error recovery and the scripting totally transparent to the user. So [AIC] can sell a product like this without getting into the communications business."

Linkware often faces charges that its host-resident file servers do not provide direct access to live production data and that they contain redundant information. Benoit responds by saying that MIS requires first and foremost a manageable environment, which Linkware's architecture provides.

"MIS doesn't want end users rummaging through their live applications from a security, integrity and performance standpoint," he says. "And end users just want the piece of information critical to their jobs. Data doesn't reside in one place anymore, but must be cut up and moved to where it's pertinent."

The rest of the story

Nevertheless, Linkware's file server architecture represents just one approach to linking micros and mainframes. Tangram Systems Corp. in Cary, N.C., for example, creates a virtual disk on a host, which IBM PC users perceive as a local disk device. The virtual disk is an application running on Tangram's LU6.2-based VTAM subsystem. File transfer is accomplished by reading from and writing to the virtual disk.

PC users can easily relate to the virtual disk concept and do not have to leave their applications to perform transfers. While Linkware provides a clean, simple user interface, PC users must exit their program to invoke Linkware file transfer. Still, both virtual disk and file server approaches have their respective advantages, observers note.

Claiming 43 of the Fortune 200 as customers, Linkware says the market for micro-to-mainframe links is split between tactical buyers looking for quick and dirty solutions to solve specific problems and strategic buyers planning comprehensive strategies for the long term.

But even strategic buyers proceed cautiously, purchasing "a small set of Linkware code, trying it out and growing from there," Benoit says. Follow-on sales composed 35% of 1986 revenue, according to the firm.

While many MIS shops are reluctant to commit to link technology before IBM plays its full hand, Linkware emphasizes to potential customers that IBM, no matter what its direction, "will not do anything for DEC VAXs, Macintoshes or the HP 3000 family." As IBM's LU6.2 and Server Requestor Programming Interface protocols unfold as standards, Linkware says it will support them.

STEVE FELDMAN

The little IBM PCs that could: Joining hosts of two vendors


GAMMA LIAISON

Without human intervention: *PCs mediate between different vendors' hosts.*

In an unusual micro-to-mainframe application involving hosts from two different vendors, four IBM Personal Computer ATs networked on an Ungermann-Bass, Inc. local-area network (LAN) serve as a data collections hub, clearing about $5 billion in government bonds traded daily.

The cluster of PCs has been dubbed "the little engine that could" for its modest but steady performance, chugging data along between an IBM MVS system and a Digital Equipment Corp. VAX/VMS host.

Installed at Prudential-Bache Securities, Inc. in New York, the system continuously downloads batches of trades from government trading systems running on an IBM mainframe to the networked PCs. Clearance-eligible trades that must be settled that day are uploaded automatically to a file server on the VAX. A file management system draws these files from the server for processing to a clearing bank. Trade results are sent back down to the PCs for further reporting and are routed back to the IBM host for bookkeeping.

The system runs without human intervention through network- and processor-independent file transfer software from Linkware Corp. in Waltham, Mass., and uses scripts that are written by Prudential-Bache.

These scripts, which are developed from Linkware's Script language, automate logon and polling and also file transfer functions.

No room for error

"This is a time-critical application," says Peggy DeGraff, Prudential-Bache's manager of government systems. "We have to get about 400 to 600 cash trades over to the VAX every business day.

"There is no margin for error," she says.

The micro-to-mainframe link replaces a system involving manual rekeying at several separate stations, dramatically improving efficiency and limiting opportunities for error, according to Prudential-Bache.

"Before, anytime there was a trade, it was input into the government trading system," DeGraff explains. "Then someone else would key it into a clearance system, then into a bookkeeping system.

"Now, instead of keying in trades three or four times, they're keyed once into the trading system, and the PC network does the rest," she says. "We don't need various clerks all over the place. We now avoid the nightmare of piecing things together when something is keyed in wrong."

PC quartet

Linkware file servers, residing on both hosts, act as staging areas for information needed by the application.

Scripts periodically poll the MVS host server and download files into a server on the PC LAN.

"We put the PCs in the middle to talk to both hosts," DeGraff says.

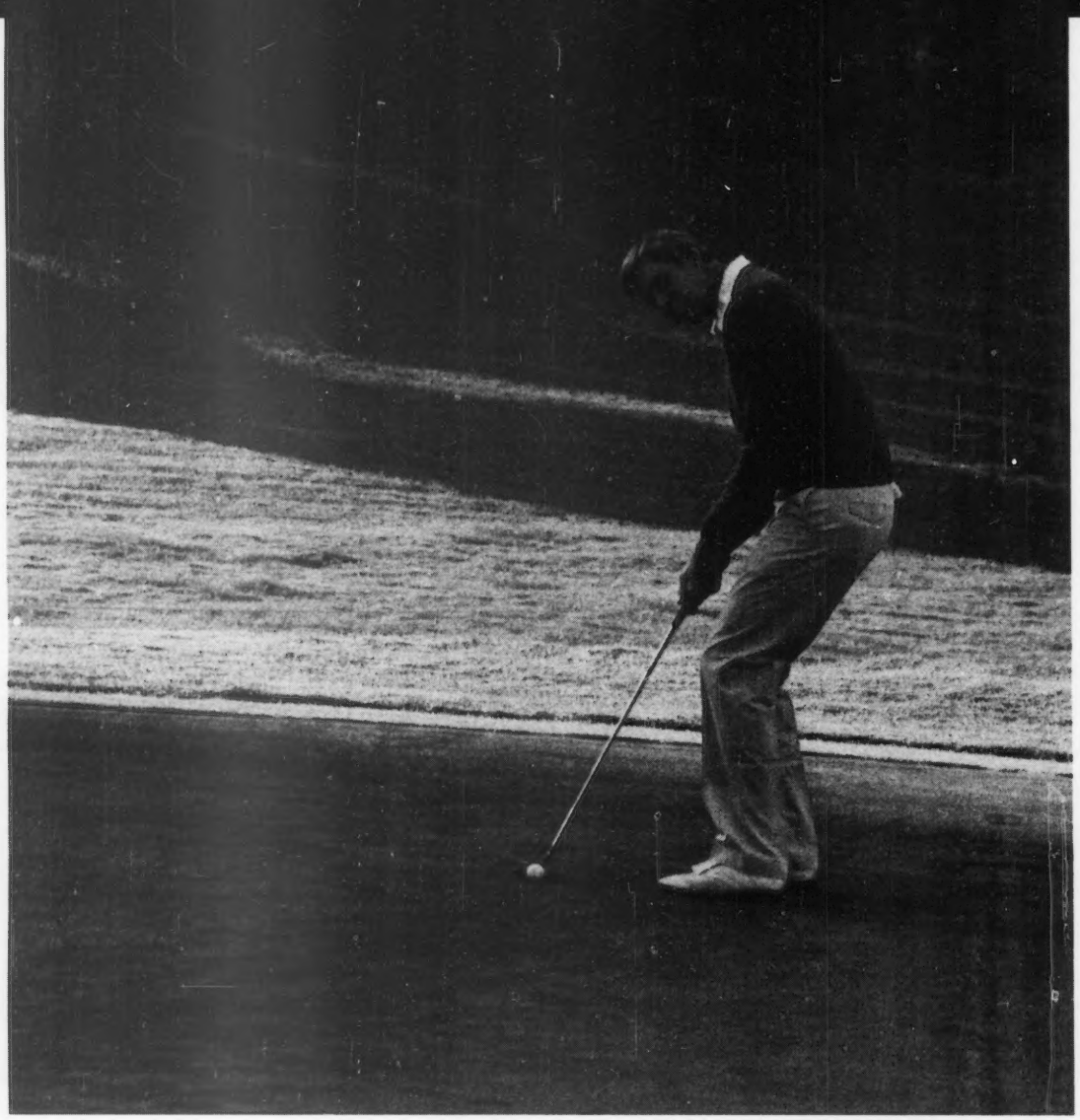
Three of the PC ATs accept file transfers and perform necessary format conversions. "The fourth PC is the central control station, which acts like a traffic cop, handling all the activities the other PCs are bringing it," explains Prudential-Bache's John Quattrocchi, a project manager. The control station maintains a master data base and system statistics.

"The entire system is totally self-supportive," DeGraff says. "No operator has to hit a single key to move files along."

Apart from the application, the control station can also perform transaction queries.

STEVE FELDMAN

THE INFORMATION TECHNOLOGY LEADERS



Bob Ashworth
VP General Manager
Information Technologies Division
McKesson Corporation
Age: 44
Budget: $65 million
Golfer

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Bob started with McKesson, the world's largest distributor of pharmaceutical products, as a project manager in applications development. His biggest single responsibility: the implementation of McKesson's proprietary Economost micro-based inventory/ordering system for druggists, which has often been credited with the company's fast rise to leadership in the highly competitive pharmaceutical distribution industry. With Economost running smoothly, Bob's attention is primarily devoted to serving the corporation at large. That means providing decision support for those who need it, guiding the company in its acquisition of PCs (600 to date), and assessing the potential applications and value of a corporate LAN.

In his spare time, Bob's an avid golfer, a snow skier, water skier and a jogger.

As you can see, Bob's schedule is full. But if you want to reach him, there's one surefire way.

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Micro-to-Mainframe Links

COMPANY	PRODUCT	LAN COMPATIBLE	ACCESSIBLE MAINFRAME DATA BASES	MICRO SECURITY	MAINFRAME SECURITY	SUPPORTS VIRTUAL DISKS	SUPPORTS EXTENDED MEMORY	MENU DRIVEN	DOWNLOAD FORMATS	MICRO MEMORY REQUIRED	EMULATION HARDWARE SUPPORTED	MAINFRAME OPERATING SYSTEM SUPPORTED	SOFTWARE REQUIRED	MICRO PORTION PRICE (PER COPY)	MAINFRAME PORTION PRICE (PER MCU)	DIAL-INQ READER SERVICE NUMBER
Adelie Corp. (617) 354-0400	Close	NA	VSAM	Yes	Yes	NA	NA	Yes	Proprietary	640K	Irma	CICS	NA	NA	NA	582
Agile, Inc. (800) 538-1634	Fusion 3270	Yes	No	No	Yes	Yes	Yes	Yes	NA	128K	IBM 3278, Irma compatible	All IBM	None	Contact vendor	Contact vendor	583
American International Communications Corp. (303) 444-6675	Network Navigator	Yes	QSAM, PDS, CMS	Yes	Yes: ACF 2, RACF, Top Secret	No	No	Yes	ASCII, CSV, DIF	256K	IBM, CXI, Irma, Forte	MVS, VM	NA	$175	$80,000	584
Answer Systems (818) 716-1616	Lotus/ Answer	Yes	IMS, VSAM, Adabas, IDMS	Yes	Yes	No	Yes	Yes	1-2-3, Symphony	256K	Irma, Forte, IBM 3278/ 9, AST, CXI	MVS MVS/ XA, DOS/ VSE, TSO, IMS/DC, CICS	Answer/DB	$550	$30,000- $45,000	585
	Dbase/ Answer	Yes	IMS, VSAM, Adabas, IDMS	Yes	Yes	No	Yes	Yes	Dbase II, III; Framework	256K	Irma, Forte, IBM 3278/ 9, AST, CXI	MVS, MVS/ XA, DOS/ VSE, TSO, IMS/DC, CICS	Answer/DB	$550	$30,000- $45,000	
Applied Data Research, Inc. (201) 874-9000	ADR/PC Datacom	Yes	Datacom/ DB	No	Proprietary	No	No	Yes	DIF, ASCII	512K	Irma, PCOX, protocol converters, gateways	MVS, DOS	Datacom/ DB, Dataquery	$495	Contact vendor	586
	ADR/PC Email	Yes	NA	No	Proprietary	No	No	Yes	ASCII	512K	Irma, PCOX, protocol converters, gateways	MVS, DOS, VM	ADR/Email	$195	Contact vendor	
Artificial Intelligence Corp. (617) 890-8400	PC Link	Yes	Intellect	No	Yes	Yes	No	Optional	WKS, ASCII	256K	IBM 3270/ PC, Irma, Microplus, Forte	VM/CMS, MVS/TSO	None	$500	$20,500	587
AST Research, Inc. (714) 863-1333	AST-PCOX	NA	All	Yes	Yes	Yes	NA	Yes	ASCII, Binary	47K	Proprietary	VM/CMS, all MVS, all CICS	Application dependent	$895	NA	588
	AST-SNA	NA	All	Yes	Yes	Yes	NA	Yes	ASCII, Binary	50K	Proprietary	VM/CMS, all MVS, all CICS	Application dependent	$895	NA	
Avatar Technologies, Inc. (617) 435-6872	Macmain-frame	NA	IDMS, IDMS/R, Adabas, IMS	Yes	Proprietary	No	Yes	Yes	ASCII, Macintosh Document Format	512K	IBM 3278-2	TSO, CICS, CMS	Avatar HFT	$1,295	$500	589
	PA100 Turbo	No	IDMS, IDMS/R, Adabas, IMS	Yes	Proprietary	No	Yes	Yes	ASCII	256K	IBM 3278-2, 3, 4; IBM 3279-2, 2A, 2B, 3A, 3B	TSO, CICS, CMS	Avatar HFT	$1,195	$500	
Banyan Systems, Inc. ((617) 898-1000	Vines	Yes	Goldengate, PC Focus	Yes	Yes	Yes	Yes	Yes	DIF, ASCII	100K	Any IBM PC compatible	CICS, TSO, MVS, CMS	None	$1,295- $3,995	$1,295- $3,995	590
Barr Systems, Inc. (904) 371-3050	Barr/Hasp	Yes	QSAM	No	No	Yes	NA	Yes	EBCDIC, ASCII, Binary	256K	Barr 2, Barr/208AB	MVS/JES, VM/RSCS, CDC/NOS	None	$1,290	NA	591
Bridge Communications, Inc. (415) 969-4400	Etherterm 3270	Yes	NA	NA	Yes	No	No	Optional	ASCII	384K	Etherlink	VM/CMS, TSO, CICS	None	$400	NA	592
CAP Gemini Software Products, Inc. (214) 247-5454	Multipro	NA	Multipro Project Library System	Yes	Yes	No	Yes	Yes	ASCII	320K	IBM 3278/ 9, Irma, PCOX, protocol converters	VM/CMS, MVS/TSO	None	$2,950	$50,000	593

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. Further product information is available from vendors.

Connection

FROM PAGE S11

networked with the first mainframe. There are several areas in which the developments will take place. The first area that will have to be addressed is efficiency. Cullinet's Armstrong says, "Underneath it all, the bottleneck is SNA. Without real breakthroughs in communications capabilities, we have a fairly low ceiling."

A more speculative area is IBM's next generation of desktop machines. IBM has stated that it is not interested in "commodity marketplaces" for cheap boxes like low-level PCs, if that is where the market goes. In marketing, the name of the game is product differentiation, and IBM learned a hard lesson in the clone wars. With a new generation poised to ship, where is IBM likely to do its differentiating?

I believe a good place to look is in connectivity. We have already seen corporate America dig in its heels at the prospect of spending $150 per copy to upgrade 1-2-3 software; is it really likely users will scrap the hardware they have now for new IBM boxes, given the relative price/ performance ratios usually associated with new PC-type products from IBM?

More to the point, will a few specialized graphics capabilities, a smaller footprint and incrementally faster CPU speed be enough to spur business to buy? It seems the answer is no. The two pieces that are likely to make a difference are a more powerful operating system and built-in, optimal connectivity.

IBM's powerful advantage with respect to the latter is that it only has to worry about connecting to itself; it can let everyone else scramble to catch up. I believe this is just the bait IBM needs for its hook. By contrast, the operating system, while a key element, is partially in someone else's hands — Microsoft's.

New connectivity facilities could be a fascinating opportunity for Tangram, whose device-driver-based architecture would permit the development of high-end communications software to install with its users. "VM mainframes today, when they first come up, already have several service machines running before a single user logs on," says Jay Kasler, cofounder and senior developer at Tangram.

"That's a model you're likely to see repeated in the future," Kasler says, as multitasking becomes available. The potential to be ready to communicate with a specific and optimized task from power-up is very attractive." •

COMPANY	PRODUCT	LAN COMPATIBLE	ACCESSIBLE MAINFRAME DATA BASES	MICRO SECURITY	MAINFRAME SECURITY	SUPPORTS VIRTUAL DISKS	SUPPORTS EXTENDED MEMORY	MENU DRIVEN	DOWNLOAD FORMATS	MICRO MEMORY REQUIRED	EMULATION HARDWARE SUPPORTED	MAINFRAME OPERATING SYSTEM SUPPORTED	SOFTWARE REQUIRED	MICRO PORTION PRICE (PER COPY)	MAINFRAME PORTION PRICE (PER MCU)	DIAL-INQ READER SERVICE NUMBER
Carleton Corp. (617) 494-1232	CQS-Infolink	Yes	IDMS, IDMS/R, Adabas, IMS	Yes	Yes	No	No	Yes	PRN, DIF, CSV, Sylk	320K	Irma, PCOX, Forte, Lee Data, IBM 3278	MVS, VM/SP	PL/1 Library, Cobol Compiler	$100-$500	$47,500	594
Cincom Systems, Inc. (800) 543-3010	PC-Contact	Yes	Supra, VSAM, IMS, DL/1, Adabas	Yes	Yes: RACF, Top Secret	No	No	Yes	ASCII, DIF	128K	Irma, PCOX	MVS, VM, DOS	Mantis 4.0	$500	$20,000-$38,000	595
Coefficient Systems Corp. (212) 777-6707	VTERM/220	No	All	No	No	Yes	No	No	ASCII, Binary	256K	IBM CP with asynchronous adapter	RSTS, VAX/VMS, RSX11, M/MT, Unix	None	$245	No charge	596
Communications Research Group (504) 923-0888	Blast	Yes	NA	NA	NA	No	Yes	Yes	Binary	256K	VT100, VT52; Data General D200	MVS, VM	None	$250	$5,500	597
Communications Solutions, Inc. (408) 725-1568	Access/SNA 3270	Yes	NA	No	Yes	Yes	Yes	Yes	ASCII, Binary	128K	Any IBM compatible SDLC card	MVS, VM, DOS/VSE	None	$200	NA	598
	Access/SNA APPC	Yes	NA	No	Yes	Yes	Yes	Yes	ASCII, Binary	128K	Any IBM compatible SDLC card	MVS, VM, DOS/VSE	None	$200	NA	
Computer Associates International, Inc. (516) 227-3300	CA-Link	No	CA-Universe, VSAM	Yes	Yes	No	NA	Yes	ASCII, Binary, DIF, Basic	256K	SDLC, Irma, PCOX	VM, DOS/VSE, MVS/XA	None	$100	$9,500-$11,500	599
Computer Corporation of America (617) 492-8860	PC/204	Yes	Model 204	No	Yes	Yes	No	Yes	ASCII, DIF, DBF	384K	Irma, PCOX	DOS, CMS	None	$500	$50,000	600
	Picture/204	Yes	Model 204	No	Yes	Yes	No	Yes	ASCII, DIF, DBF	512K	Irma, PCOX	DOS, CMS	Picture-power	$800-$950	NA	
	PC/Workshop	Yes	Model 204	No	Yes	Yes	No	Yes	User Language Procedure	640K	Irma, PCOX	DOS, CMS	None	$500	$35,000	
Computer Logics (416) 674-1111	PEP	Yes	Mapper, DMS 1100	Yes	Yes	No	No	No	ASCII	256K	Proprietary	OS3,OS/1100	None	Contact vendor	Contact vendor	601
	Comlock	No	IMS, IDMS, Adabas, Mapper	Yes	No	Yes	No	Yes	ASCII	256K	Proprietary	CMS, OS/3, OS/1100, MVS, CMS, MCP	None	Contact vendor	Contact vendor	
Computerized Office Services, Inc. (313) 665-8778	Synchrony	No	None	No	Yes	No	NA	Yes	ASCII	100K	RS-232	Unix	None	$245	$545-$995	602
Comshare, Inc. (800) 922-7979	W/Information Gateway	No	IDMS, DB2, Total, VSAM, SQL/DS, Sequential files	Yes	No	No	No	Yes	ASCII, Binary, DIF, Dbase	512K	Irma	VM/CMS, MVS/TSO, VMS, VAX/VMS	W/Datman	$450	$6,400-$13,000	603
Consolink Corp. (800) 525-6705	Microlan 1000	Yes	DB2	Yes	No	Yes	Yes	Yes	ASCII	NA	NA	VAX/VMS	Street Talk	$150	NA	604
	Microlan 2000	Yes	DB2	Yes	No	Yes	Yes	Yes	ASCII	NA	NA	VAX/VMS	Street Talk	$120	NA	
Corvus Systems, Inc. (408) 281-4100	SNA Gateway	Yes	DB2, VSAM, SQL	Yes	Yes: RACF, Top Secret	No	No	Optional	ASCII, Binary	256K	IBM 3278/9	VM, MVS	Proprietary	Contact vendor	Contact vendor	605
Cullinet Software, Inc. (617) 329-7700	C/ICMS	NA	IDMS/R, VSAM, IMS	No	Yes	No	No	Yes	Goldengate, ASCII, DIF, WKS, DBF	384K	Irma, INS, PCOX, Forte	All OS and DOS systems	Goldengate, Infogate	$300-$695	$75,000	606
CXI, Inc. (800) 225-PCOX	PCOX/One-APA	Yes	GDDM, Disspla, SAS/Graph, Telegraph	Yes	Yes	Yes	Yes	Yes	PIF	350K	PCOX	All	None	$595	NA	607
	CXI$file	Yes	CICS, TSO, VM/CMS	Yes	Yes	Yes	Yes	No	ASCII, EBCDIC	NA	PCOX	All	None	NA	$395	
D&B Computing Services, Inc. (203) 762-2511	Beamit	Yes	Nomad2, SQL, DB2, IMS, IDMS	No	Yes	No	No	Yes	1-2-3, DIF, Symphony, PC Nomad	64K	Irma, Forte, IBM 3278/9, PCOX	VM/CMS, MVS/TSO	Nomad2	NA	$5,000	608
Datability Software Systems, Inc. (800) 342-5377	RAF	Yes	All VAX/VMS	No	Yes	Yes	Yes	No	ASCII, Binary	256K	VT100, VT220	VAX/VMS, TOPS 20	None	$395	$395-$25,000	609
Dataviz, Inc. (203) 366-4944	Maclink Plus	Yes	None	Yes	Yes: Top Secret, RACF	No	Yes	Yes	ASCII, DIF	256K	Macintosh, Teletype	VS	Omnigate Allegro-server	$350	$495-$4,000	610
Digital Communications Associates, Inc. (404) 442-4000	Irmalink FT/TSO	NA	NA	Yes	No	Yes	Yes	Yes	ASCII, Binary, EBCDIC	128K	Irma	MVS/TSO	None	$75	$125	611
	Irmalink FT/CMS	NA	NA	Yes	No	Yes	Yes	Yes	ASCII, Binary, EBCDIC	128K	Irma	VM/CMS	None	$75	NA	
Diversified Data Resources, Inc. (800) 233-3374	RCOM	No	VSAM, spooler queues	No	Yes	No	No	Optional	Binary, ASCII	96K	Hydra	VM, CICS under MVS, DOS/VSE	None	$69.95	$4,000-$8,000	612

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DTSS, Inc. (603) 643-6600	Datapass	NA	None	Yes	Yes	No	No	Yes	ASCII, Binary	192K	None	GCOS 3, 8; MOD400; Unix; VM/CMS; VAX/VMS	None	$165	$995-$4,900	613
Dylakor (818) 366-1781	Dyl-Vlink	No	IMS, DL/1, IDMS/R, QSAM, ISAM, VSAM, BDAM	Yes	Yes	Yes	Yes	Yes	All	256K	Irma, Forte, PCOX, IDE	MVS, OS, VM, DOS/VE	None	$1,240	No charge	614
Execucom Systems Corp. (800) 531-5038	Link	NA	IFPS	No	Yes	No	No	No	ASCII	512K	Asynchronous, Irma, Forte, IBM 3270/PC	MVS/TSO, VM/CMS, Primos, VAX/VMS	IFPS/Plus	$895	$40,000-$85,000	615
FEL Computing (802) 348-7171	Mobius	Yes	All	Yes	Yes	Yes	Yes	Optional	ASCII, Binary	80K	VT100	VAX/VMS, TOPS 10, TOPS 20	None	$250	$3,500	616
1st Desk Systems, Inc. (617) 533-2203	1st Port	NA	All	No	No	Yes	NA	Yes	ASCII, DIF, Sylk	128K	NA	All	None	$295	NA	617
Fox Research, Inc. (800) 358-1010	10-SNA Turbo LAN Mainframe Gateway	Yes	All	Yes	Yes: RACF	Yes	Yes	No	All	512K	IBM 3274	SNA, MVS/TSO, VM/CMS, CICS	File transfer program	$695	$1,995	618
	10-BSC Turbo LAN Mainframe Gateway	Yes	All	Yes	Yes: RACF	Yes	Yes	No	All	512K	IBM 3274	CICS, MVS/TSO, VM/CMS	File transfer program	$695	$1,995	
Gateway Communications, Inc. (800) 367-6555	G/SNAnet	Yes	Any SNA/SDLC supported application	Yes	Yes	Yes	Yes	Yes	EBCDIC, ASCII	256K	IBM 3270/3770 RJE	Any IBM 3270, RJE environment	Any IBM 3270, IND$FILE, RJE environment	$2,530-$4,530	NA	619
Gateway Microsystems, Inc. (512) 345-7791	Synclink	No	All	No	No	No	No	No	Binary, ASCII	256K	Synclink	CICS, TSO, MVS	PCOM, RJE, IBM 3270/SNA/BSC	$995	NA	620
Grafpoint (408) 249-7951	Tgraf-05	NA	NA	No	Yes	NA	NA	Yes	NA	256K	Tektronics	Various	Application dependent	$395	NA	621
	Tnet-05	Yes	NA	No	Yes	NA	NA	Yes	NA	256K	Tektronics	Various	Application dependent	$395	NA	
Hewlett-Packard Co. (916) 786-8000	Information Access	Yes	Image 300	Yes	Yes	Yes	Yes	Yes	WKS, ASCII, DIF	512K	NA	MPE	None	$395	$500	622
Honeywell Information Systems (800) 328-5111	PC 7800	Yes	All GCOS, DBMS	Yes	Yes	Yes	Yes	Optional	ASCII	NA	Any RS-232 port	GCOS	None	$295	NA	623
IBM Information Systems Group (914) 934-4000	IBM PC 3270 Emulation Program 3.0	Yes	VSAM	Yes	Yes	Yes	Yes	Yes	EBCDIC, ASCII	155K	Proprietary	Xenix	IBM PC-DOS	$475	NA	624
Ideassociates, Inc. (617) 663-6878	Ideacomm 3278	No	TSO, VM, CICS	No	No	Yes	No	Yes	ASCII	128K	All	All	None	$995	NA	625
	Ideacomm	No	TSO, VM, CICS	No	No	Yes	No	Yes	ASCII	128K	All	All	None	$895	NA	
Information Builders, Inc. (212) 736-4433	Focfalk	Yes	DB2, SQL/DS, IMS/DB, IDMS, Total, Database	NA	Yes	NA	NA	Yes	ASCII, DIF, PRN, WP, 1-2-3	256K	Irma, Forte, PCOX, IBM 3270/PC, IBM 3278	VM/CMS, MVS/TSO, CICS	Focus Report Writer, PC Data Export	$450	Contact vendor	626
Information Resources, Inc. (617) 890-1100	Easytrac	No	Infoscan, Nielson Data, CME, Sami Data	Yes	Yes	Yes	Yes	Yes	DIF	640K	Irma, Forte	VM/CMS, Primos	None	$1,495	NA	627
	PCexpress	No	All	Yes	Yes	Yes	Yes	Yes	DIF ASCII	640K	Irma, Forte	NA	None	$1,495	NA	
Information Technologies, Inc. (800) 431-3460	Linkup	Yes	All	No	Yes	Yes	Yes	Yes	ASCII, EBCDIC, Binary	256K	IBM 3270, 3770, 378	All IBM and IBM compatibles	Application dependent	NA	$720	628
Innovative Computer Products (800) 228-LINK	Tempus-Link	Yes	VSAM	Yes	Yes: Top Secret, RACF	Yes	NA	Yes	PRN	128K	AT&T, Microplus, IBM 3270/PC, Irma, Forte, CXI, ITT, Lee Data, Banyan	MVS/TSO, MVS/CICS, MVS/IMS, VM/CMS, DOS/VSE	None	NA	$9,800-$60,000	629
	Tempus-Access	Yes	IDMS, DL/1, VSAM	Yes	Yes: Top Secret, RACF	Yes	NA	Yes	PRN	128K	AT&T, Microplus, IBM 3270/PC, Irma, Forte, CXI, ITT, Lee Data, Banyan	MVS/TSO, MVS/CICS, MVS/IMS, VM/CMS, DOS/VSE	None	NA	$9,800-$60,000	
Integrated Network Systems, Inc. (800) SNA-3270	SDLC PC Adapter	Yes	IDMS	No	Yes	Yes	No	Yes	All	128K	INS	All	None	$995	NA	630

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KMW Systems Corp. (512) 338-3000	SDLC Gateway PC Adapter	Yes	IDMS	Yes	Yes	Yes	No	Yes	All	256K	INS	All	None	$1,995	NA	
	AVSCOM 8400 VME channel interface	Yes	NA	No	NA	NA	NA	NA	NA	2K-10K	NA	All	Application dependent	Contact vendor	Contact vendor	
	AVSCOM 8900 Q-bus channel interface	NA	NA	NA	NA	NA	Yes	NA	NA	5K-32K	IBM	All	Application dependent	Contact vendor	Contact vendor	
Linkware Corp. (800) 356-1212	Linkware Information Server	Yes	None	NA	Yes: Top Secret, RACF, ACF 2	No	NA	Yes	WKS, DIF, PRN, CSV, Sylk	NA	NA	MVS/TSO, Unix, MVS/VTAM, VM/CMS, VAX/VMS	NA	NA	$2,000-$35,000	632
	PC Connection	Yes	NA	No	NA	No	NA	Yes	WKS, DIF, PRN, CSV, Sylk	256K	IBM 3270, PCOX, Forte, Irma	MVS/TSO, Unix, MVS/VTAM, VM/CMS, VAX/VMS	None	$500	NA	
Locus Computing Corp. (213) 452-2435	PC-Interface	Yes	Any Unix data base	Yes	Yes	Yes	Yes	No	All	30K	IBM PC or PC compatible	Unix V.2, Ultrix 1.1, 1.2, 4.2, Xenix	None	$250	$500	633
Management Science America, Inc. (404) 239-2000	Expertlink	No	IMS, IDMS, Datacom/DB	Yes	Yes	No	No	Yes	ASCII; DIF; WKS; WRK; Dbase II, III	256K	CXI, Irma, IBM 3278, 3270/PC, Microplus, PC Pathways	MVS, VSE	Information Expert for file transfer only	$3,000	NA	634
McCormack & Dodge Corp. (617) 655-8200	Interactive PC Link	Yes	IMS, IDMS, VSAM, Adabas	Yes	Yes	Yes	NA	Optional	ASCII	256K	Irma, Forte, CXI, IBM 3278/9, IBM 3270/PC	DOS	None	$1,100	$32,500	635
Metaresearch, Inc. (503) 228-5806	Griffin Terminal-100	No	Chemical Abstracts On-Line	No	No	Yes	Yes	Optional	ASCII, Binary	128K	TEK4012, VT100	VMS, Unix	None	$99	NA	636
Micro Decisionware, Inc. (303) 443-2706	PC/SQL-Link	Yes	VSAM, SQL, DB2, Terdata, Britton Lee	Yes	Yes: Any TSO security package	Yes	Yes	Yes	DIF, IXF, DBF, PRN	320K	Irma, Forte, IBM 3270/PC, 3278/9; SDLC; CXI	MVS, VM	None	$295-$595	$19,800	637
Micro-Integration, Inc. (800) 237-5888	Micro-SNA/3270	Yes	None	Yes	No	Yes	No	Yes	ASCII, Binary	256K	RS-232	All	None	$695	NA	638
	Coaxxsys	Yes	None	Yes	No	Yes	No	Yes	ASCII, Binary	64K	Proprietary, Irma	All	None	$895	NA	
Micro Tempus, Inc. (800) 361-4983	Tempus-Access	Yes	Total, Adabas, VSAM, IMS, DL/1, IDMS	Yes	Yes	Yes	No	Yes	PRN	84K	Irma, IBM, Forte, PCOX, AST, Microplus	MVS/CICS, MVS/TSO, DDS/VSE/CICS	Tempus-Link	No charge	$13,900	639
	Tempus-Link	Yes	Total, Adabas, VSAM, IMS, DL/1, IDMS	Yes	Yes	Yes	No	Yes	NA	128K	Irma, IBM, Forte, PCOX, AST, Microplus	MVS/CICS, MVS/TSO, MVS/IMS, DOS/VSE/CICS, VM/CMS	None	No charge	$9,800-$60,000	
Midwest Data Source, Inc. (513) 752-3311	Intercom	Yes	DMSII	Yes	Yes	Yes	No	Yes	ASCII, Binary, WKS, DIF	256K	Intercom 1000	MCP	XTRACT, ICC/Link	$295-$745	Contact vendor	640
The MOM Corp. (800) 241-1170	PC/COM-FT	No	None	No	Yes	No	Yes	Optional	DIF, WKS, ASCII, Binary	64K	Irma, Forte, CXI, AST, Quadram, Microplus, Renex, ITT	DOS, MVS, VM	None	$395	$1,000-$2,000	641
	PC/COM-BL	No	None	Yes	Yes	No	Yes	Yes	DIF, ASCII, CSI	256K	IBM, Irma, CXI, Forte	DOS, MVS, VM	None	$195-$695	$2,995-$25,000	
Multi-Soft, Inc. (201) 549-7722	Super-Link	Yes	None	Yes	No	Yes	No	Yes	ASCII, Binary, DIF, PRN	384K	IBM 3270, Irma, PCOX	MVS, VM, DOS/VSE, VAX/VMS	IBM PL/1, Library	$50-$200	$48,000	642
Nastec Corp. (313) 353-3300	Design Aid/Host Link	Yes	NA	Yes	No	Yes	Yes	Optional	ASCII	640K	IBM PC and emulators	DOS, VMS	Tempus-Link	$6,900	NA	643
Network Software Associates, Inc. (714) 768-4013	Adapt SNA	No	VSAM	No	Yes	No	No	No	ASCII, Binary	256K	IBM SDLC	MVS, DOS/VS, DOS/VSE	None	$585	NA	644
On-Line Business Systems, Inc. (415) 391-9555	Excellink	Yes	NA	Yes	Yes: RACF 2, RACF, Top Secret	No	No	Yes	Sylk, WKS, CSV, DIF	128K	Irma, Forte, CXI, Asynch-ronous	VM, MVS	None	$75-$200	$7,500	645
	VDAM	Yes	NA	Yes	Yes: RACF 2, RACF, Top Secret	Yes	No	Yes	Sylk, WKS, CSV, DIF	128K	Irma, Forte CXI	MVS	None	$45-$400	$8,500	
On-Line Software International, Inc. (800) 526-0272	Omnilink	No	ISAM, BDAM, VSAM, DL/1, IDMS	Yes	Yes	Yes	Yes	Yes	WKS, DIF, ASCII	256K	IBM 3270	DOS/VSE, MVS/OS, CICS	None	$495	$20,000-$30,000	646

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On-Line Software International, Inc. (800) 526-0272	Free-Link	No	ISAM, BDAM, VSAM	Yes	Yes	Yes	Yes	Yes	WKS, DIF, ASCII	256K	IBM 3270, Asynch-ronous	DOS/VSE, MVS/OS, CICS	None	$495	$6,000-$10,000	
	Ramlink	No	IMS, DL/1, DB2, SQL/DS, IDMS, Total	Yes	Yes	No	Yes	Yes	ASCII, DIF, Keepit, Sequential	512K	Irma, Forte, IBM 3278/9, 3270/PC, PCOX	VM/CMS, MVS/TSO, CICS, MVS/OS, TCAM	Ramis	$375	$49,000-$115,000	
Oracle Corp. (800) 345-DBMS	SQLstar	Yes	Oracle, DB2	Yes	Yes	NA	Yes	Optional	WKS	640K	Irma, IBM 3270, Decnet	MVS, VM, Unix, VMS, AOF, Primos, UTF, GCOS, VF	Application dependent	$695-$1,695	Contact vendor	647
The Orion Group, Inc. (415) 548-0947	SNA 62 Peer Communica-tions Facility	No	NA	Yes	Yes	Yes	NA	Optional	NA	256K	NA	Any IBM	None	NA	NA	648
	DIA Source/ Recipient Facility	No	NA	Yes	Yes	NA	NA	Yes	NA	256K	NA	Unix	None	NA	NA	
Package Solutions, Inc. (516) 752-1640	Bloom M-3700	No	NA	No	No	No	No	Yes	ASCII	64K	IBM 3780/2780	MFT, NVT	None	$895	NA	649
Pansophic Software Corp. (800) 323-7335	Panlink	Yes	None	Yes	Yes	Yes	Yes	Yes	ASCII	16K	Banyan Server, IBM 3278/9, PCOX, Irma, INS, AST-SNA, AST-BSC	CICS, CMS, TSO, IMS	None	NA	$9,900-$60,000	650
	The Corporate Tie	Yes	All	Yes	Yes	Yes	Yes	Optional	ASCII	16K	Irma, Forte, Micropius	CICS	NA	NA	$18,000-$42,000	
Pathway Design, Inc. (617) 237-7722	PC Path	NA	All	Yes	Yes	Yes	Yes	Optional	Any	256K	SNA 3270, Proprietary	All	None	$890	NA	651
	Netpath	Yes	All	Yes	No	Yes	Yes	Yes	Any	256K	Proprietary	All	None	$2,495-$4,495	NA	
Performance Software, Inc. (804) 794-1012	Masterlink	Yes	VSAM, Spooler files	Yes	Yes: Top Secret, RACF	No	No	Yes	CSV, DIF, ASCII, Binary	40K	Irma, CXI, AST, Hydra, ITT, Forte, Renex	DOS/VSE, MVS	CICS	NA	$6,500-$9,500	652
Persoft Inc. (608) 273-6000	Smarterm 240	Yes	NA	No	No	NA	NA	Yes	ASCII, Binary	512K	NA	Any DEC operating system	None	$295	NA	653
	Smarterm 400	Yes	NA	No	No	NA	NA	Yes	ASCII, Binary	192K	NA	Any Data General operating system	None	$149	NA	
Phaser Systems, Inc. (415) 434-3990	VDAM	Yes	IDMS, IMS, CICS	Yes	Yes: ACF 2, RACF, Top Secret	Yes	Yes	Yes	EBCDIC, ASCII, field translation	64K	IBM 3278/9, 3770, 3276, asynch-ronous	MVS	ACF, VTAM	Free	$9,000-$50,000	654
Polygon, Inc. (314) 576-7709	Poly-Star	Yes	Datatrieve	No	No	No	No	Yes	ASCII, Binary	400K	VT100, VT52, VT220, VT241	VAX/VMS	Poly-XFR/ Host	$300	$585	655
Protocol Computers Inc. (818) 880-4900	Smartlink	Yes	VTAM	Yes	Yes	No	Yes	Yes	ASCII, Binary, EBCDIC	128K	NA	VMS	None	$195	NA	656
Quadram Corp. (404) 923-6666	Mainlink Plus Coax Connection	Yes	All	Yes	NA	No	No	Yes	ASCII, Binary	384K	IBM 3278/9, 3287	All SDLC-supported operating systems	Application dependent	$1,145	NA	657
	Mainlink Standard Coax Connection	Yes	All	Yes	NA	No	No	No	NA	96K	IBM 3287/9, 3287	All SDLC-supported operating systems	Application dependent	$895	NA	
	Quad3270 Gateway	Yes	All	Yes	NA	No	No	Yes	ASCII, Binary	128K	IBM 3278/9	All SDLC-supported operating systems	Application dependent	$3,290-$5,742	NA	
Relational Technology, Inc. (800) 4INGRES	Ingres/ PCLink	Yes	Ingres	No	Yes	Yes	No	Yes	ASCII, Binary, WKS, DBF, DIF, Sylk, WK1, WRK, WR1, DBF II, DBF III, Ingres	256K	VT100, VT220	VAX/VMS, Unix, VM	No	$200	$22,000	658
Renex Corp. (703) 491-3300	RLink/RAP	Yes	All	Yes	NA	Yes	NA	Yes	Binary, ASCII	384K	Renex, CXI, IBM	All	Application dependent	$150	NA	659
The Santa Cruz Operation, Inc. (800) 626-UNIX	SCO Unipath SNA-3270	Yes	NA	Yes	No	No	No	Yes	ASCII, Binary	256K	UDS, Sync-UP, SCO, synch-ronous, Persyst	All IBM compatible	Xenix	$595-$1,995	NA	660

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SAS Institute, Inc. (919) 467-8000	Base SAS Software	Yes	SAS	No	No	No	No	Optional	DIF, ASCII	512K	Irma, CXI, Forte, IBM 3278/9	OS, MVS, CMS	None	NA	$5,000-$12,000	661
SCA Products and Services, Inc. (212) 532-2990	Gateway PC	Yes	Ramis, Focus	Yes	Yes	No	No	Yes	ASCII, Binary	512K	Irma, Forte, CXI, IBM 3278/9, VT100, VT52, Teletype X.PC, X. Modem	VM, MVS/TSO	None	$350	$18,000	662
Simware, Inc. (613) 727-1779	SIM 3278	NA	All IBM DBMS	Yes	Yes	Yes	NA	Yes	IBM 3270, ASCII	NA	NA	VM, MVS/VTAM	None	NA	$9,500-$20,000	663
	SIM 3278/PC	Yes	All IBM DBMS	Yes	Yes	Yes	Yes	Yes	IBM 3270, ASCII	256K	Irma, Forte, IBM 3270	VM, MVS/VTAM	None	$250	NA	
Sinper Corp. (201) 662-7999	TM/1 2.0	Yes	None	No	No	Yes	No	Yes	ASCII, WKS, Dbase III, DIF	256K	NA	NA	None	$795	NA	664
Softronics, Inc. (303) 593-9540	Softerm PC	Yes	All	No	Yes: Top Secret, RACF	Yes	No	Yes	Any	192K	IBM async. boards	VAX/VMS, Unix, AOS, CICS	Application dependent	$195	NA	665
Software AG of North America, Inc. (800) 336-3761	Natural Connection	NA	Adabas, VSAM, DL/1	Yes	Yes	No	No	Optional	WKS, WK1, Dbase III, DIF, ASCII	320K	Irma, ITT, IBM 3278/79, PCOX, async. dial-up	OS, MVS, MVS/XA, DOS	None	$250-$1,000	$15,000-$25,000	666
SPSS, Inc. (312) 329-3500	SPSS/PC+	NA	Datatrieve, SQL/DS, Image	NA	NA	No	No	Yes	ASCII	348K	Heath 19	All	SPSS-X	$795	$3,000-$10,000	667
Sterling Software Systems Software Marketing Division (916) 635-5535	PC-Tracs	Yes	None	Yes	Yes: Top Secret, RACF, ACF 2	No	NA	Yes	ASCII, EBCDIC	64K	IBM 3780, 3770, 2780, 3274/3270	All	None	$950	NA	668
	Supertracs	NA	None	Yes	Yes: Top Secret, RACF, ACF 2	No	NA	NA	Any	NA	IBM 2780, 3780	DOS, OS/MVS	None	NA	$18,000-$25,000	
The Systems Center (800) 292-0104	NDM-PC	Yes	None	Yes	Yes	No	Yes	No	ASCII, Binary	300K	CXI, Pathway, PC Path, SNA 3270	MVS, VSE	Application dependent	$400	$22,000	669
Systems Strategies, Inc. (212) 279-8400	VAX-Link/SNA	Yes	All VAX	NA	NA	NA	NA	Yes	ASCII, EBCDIC	NA	KMV, KCT	MVS, OS, DOS/VM	C-Compiler	$3,500-$7,000	NA	670
	VAX-Link/BSC	Yes	All VAX	NA	NA	NA	NA	Yes	ASCII, EBCDIC	NA	KMV, KCT	MVS, OS, DOS/VM	C-Compiler	$3,500-$7,000	NA	
Sytek, Inc. (415) 966-7400	Sytek System 2000/System 6000	Yes	NA	No	Yes	Yes	No	Yes	ASCII	80K	VT100, VT52, KSI	Ultrix, VAX, VMS	NA	$78	$5,300	671
Tangram Systems Corp. (919) 481-4444	Arbiter	Yes	SAS data sets, flat files	Yes	Yes: ACF 2, RACF, Top Secret	Yes	NA	Optional	Any	32K	CXI, Irma, INS, IBM 3278, 3708, NCP, Datastream, APPC	MVS, MVS/XA	ACS/VTAM	NA	$12,500-$39,000	672
Techland Systems, Inc. (800) Techland	Bluelynx 3270R	Yes	Infogate, Goldengate, Arbiter, Micro Tempus	No	Yes: RACF, Top Secret	Yes	Yes	Optional	EBCDIC, ASCII	192K	IBM 3278/9	All	None	$795	NA	673
	Bluelynx 3270 Advanced Coax	Yes	Infogate, Goldengate, Arbiter, Micro Tempus	Yes	Yes: RACF, Top Secret	Yes	Yes	Optional	EBCDIC, ASCII, Binary, Batch	220K	IBM 3278/9	All	IBM HFT	$995	Contact vendor	
Tesseract Corp. (415) 543-9320	Intelligent Data Link	No	VSAM, IDMS, IMS	Yes	Yes	NA	NA	Optional	DIF, ASCII	256K	IBM 3270 SNA, Irma	MVS/DOS	CICS, IMS DC	$495	No charge	674
Tri-Data (415) 969-3700	Netway 1000A	Yes	Yes	Yes	No	Yes	NA	Yes	EBCDIC, Avatar HFT	512K	Netway 1000A	CMS, TSO, VM, CICS, VS	None	No charge	$3,195	675
Trisystems Corp. (603) 883-0558	TC-Link	Yes	All	No	Yes	Yes	Yes	Yes	ASCII	128K	IBM 3270, 5250	VM, MVS/TSO	None	$799-$4,169	NA	676
TSI International (203) 846-2101	Key/Master XTA	Yes	VSAM	Yes	Yes	Yes	Yes	Optional	Proprietary	512K	Irma, RJE	All	None	$300-$1,000	$11,500-$35,000	677
VM Personal Computing, Inc. (203) 798-6755	Relay Gold	Yes	All	Yes	Yes	No	No	Optional	Any	192K	Irma, Forte, IBM 3270	VM/CMS, MVS/TSO	None	$250	NA	678
	Relay/VM, Relay/TSO	Yes	All	Yes	Yes	No	No	Yes	Any	192K	Irma, Forte, IBM 3270	VM/CMS, MVS/TSO	None	NA	$6,500-$9,500	
Winterhalter & Associates (313) 662-2002	Data Talker 3270	No	All	Yes	NA	NA	NA	Yes	Any	128K	IBM 3270, 3278/9	All	None	$1,295-$2,395	NA	679
	Data Talker Cluster	No	All	Yes	NA	NA	NA	Yes	Any	128K	IBM 3270, 3278/9	All	None	$1,295-$2,395	NA	
	Data Sync	No	All	Yes	NA	NA	NA	Yes	Any	128K	IBM 3270, 3278/9	All	None	$1,295-$2,395	NA	

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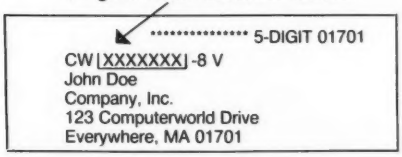

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☐☐☐☐☐☐☐☐☐☐ # #

5. When the recording says, "Enter magazine code and issue code," enter these numbers and symbols:

1 4 5 # 7 0 7 # #

6. You will be prompted to enter the DIAL-INQ number, including the symbols, for the first product/service you've identified below. You will be prompted to repeat this step as needed to input additional DIAL-INQ numbers.

To key in more than 17 inquiries, simply make another telephone call once you've signed off from the first.

1. ☐☐☐ # #
2. ☐☐☐ # #
3. ☐☐☐ # #
4. ☐☐☐ # #
5. ☐☐☐ # #
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14. ☐☐☐ # #
15. ☐☐☐ # #
16. ☐☐☐ # #
17. ☐☐☐ # #

7. Complete your phone call by entering the following symbols:

# #

You've now successfully completed your inquiry call to *Computerworld* DIAL-INQ. Remember . . . you can make as many phone calls as you wish — and request information about products/services in any SPOTLIGHT section up to three months from the issue date.

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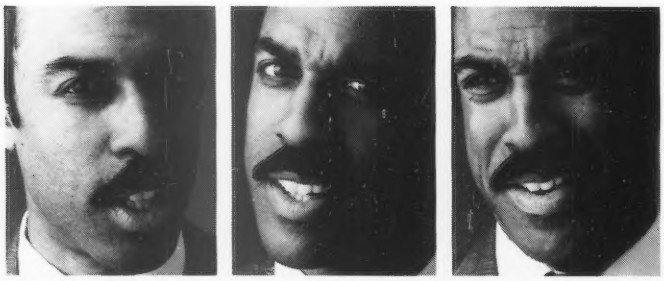
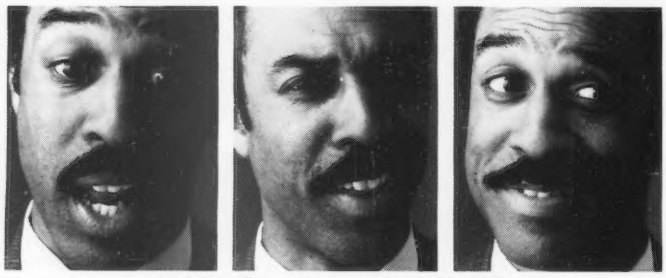


10:12: *"Talk to the mainframe with my PC? Who are they kidding?"*



10:18: *"Hey, it just answered back."*

10:29: *"I talked to the mainframe. Wait'll I tell my kid."*

The idea makes sense. Most of today's strategic computing is being done by end users on the PC. Yet most of the information they need is stored on the mainframe.

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How *not* to build an expert system shell

One firm's folly offers a lesson in choosing a development tool

BY HENRY ERIC FIRDMAN

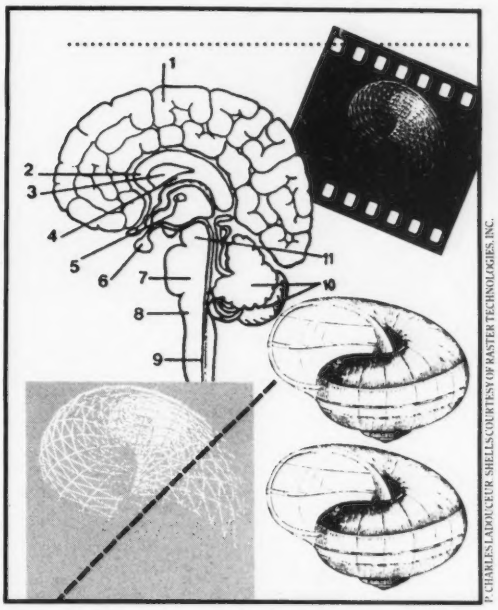
Consider the following situation: Victory Group, a venture capital firm, is funding Genesis Corp., an expert systems start-up. (Both are real firms with fictional names.) Genesis's technical staff consists of experienced programmers, all accomplished in conventional software development.

As a demonstration model, Genesis presents a 20-rule expert system. More precisely, the system is a simple decision tree to which, Genesis emphasizes, additional functionality will be added at the project's next stage. According to the business plan, Genesis will develop a full-scale rule-based prototype of the system in the next six to nine months.

The final product must be an interactive system. While Genesis's demo shows an excellent response time, the end-user interface is not very effective. Genesis tells Victory that this will be fixed at later stages of the project.

In addition, the business plan calls for product sales to be high-volume and therefore relatively inexpensive. For this reason, a personal computer-like environment is virtually mandatory, and development under expensive expert system shells was not considered.

Nine months later, Genesis comes up with a 500-rule prototype. This prototype is not just a decision tree; in some situations, a number of alternative rules can be applied so that a truly smart system could make a choice among the rules. Superficially, the prototype seems to be a genuine expert system.



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But, what a system: It sometimes takes four to five minutes to respond to a relatively simple end-user query. As a result, Victory reasonably figures that the consequences of developing an efficient end-user-oriented interface on top of this prototype may be devastating to system performance.

The venture firm realizes that the product Genesis outlined in its business plan may never come to fruition unless radical measures — perhaps a total redesign — are taken immediately.

As a result, a lot of finger pointing goes on between Genesis and Victory. Some of Victory's partners even maintain that Genesis deliberately misrepresented its product. Some people from Genesis accuse Victory of ignorance, claiming that performance degradation is intrinsic to artificial intelligence technology.

Learning by mistake

The selection of a cost-effective expert system development tool or shell should be a cautious process. There are a number of subtle issues that need to be addressed and shell parameters to be considered to provide a reasonable fit between the application and the shell.

What really happened to Genesis's expert system? First of all, having previously dealt with structured, nested IF-THEN-ELSE statements such as decision tables or trees, Genesis's technical staff believed that the time required to find a relevant rule changes logarithmically with the total number of rules.

That belief was a mistaken one, resulting from lack of AI experience. In fact, because of the nature of forward- and backward-chaining control mechanisms and, of course, the pattern matching on which both are based, the time required to find a relevant rule changes in the following ways:

- Linearly with the total number of rules, if only one rule can be applied in each situation. In this case, the total set of rules can be thought of, at the conceptual level, as a linear array of rules, with the forward- or backward-chaining control mechanism including array lookup as its inner loop.
- Exponentially, if a number of alternative rules can be applied in some situations. In this case, the total set of rules can be regarded as a tree that must be exhaustively searched by the forward- or backward-chaining control mechanism to find a relevant rule.

With this understanding, it is not surprising that the Genesis prototype performed poorly. One can see in this case story a typical example of combinatorial explosion. Each time the prototype faces the problem of choosing among alternative rules, it solves the problem blindly by brute force, randomly picking out one rule and then trying another if the first does not succeed, resulting in performance degradation.

We can draw some important conclusions from this part of the story:

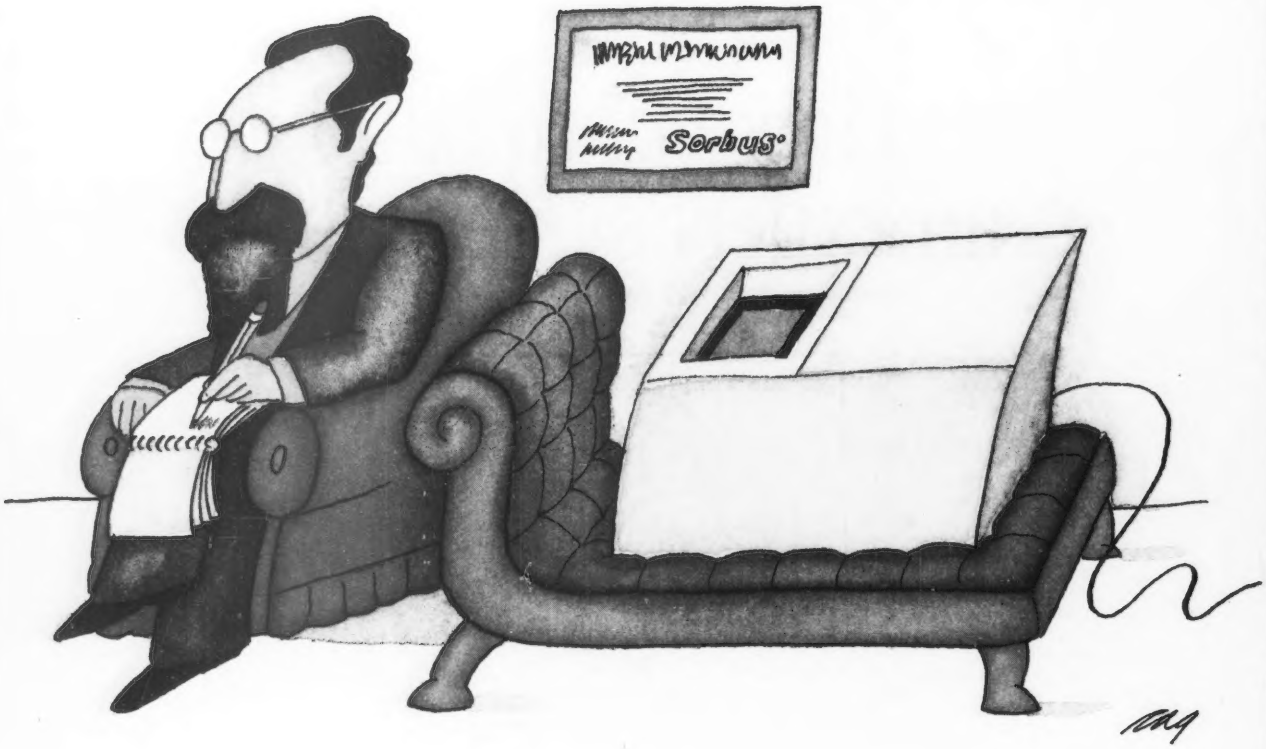
Lesson 1. *There are two*

• Expertise, performance equally vital

• Adding one rule will double your runtime

• Buy or build? Know your options

Firdman is president of Henry Firdman & Associates, a Lexington, Mass.-based consulting firm specializing in artificial intelligence and expert systems. He is publisher of "AI Through the Looking Glass," a newsletter on the AI industry. Another version of this article first appeared in *AI Expert* magazine.



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equally important facets of expert system performance — the scope of its expertise and its running time. Neither of them can be ignored in expert system development.

Although it had an impressive running time, Genesis's 20-rule demo did not maintain sufficient scope of expertise. Conversely, the prototype, while it had some scope of expertise, had an excessive running time.

Lesson 2. *Special measures aimed at achieving an increasing scope of expertise in accordance with efficiency requirements should be taken; otherwise, scope of expertise and running time will be conversely related. Taking these measures — not just adding new rules — makes up the most difficult part of expert system development.*

Genesis did not take these measures — an obvious indication of its ignorance.

Control strategies

What could have been done? This question brings us to the well-known notion of a control strategy — a set of chunks of problem-specific heuristic knowledge that guides a problem-solving process and makes it more efficient.

A control mechanism — forward or backward chaining — and a control strategy cooperate in that the control mechanism provides the search while the control strategy makes the search reasonable in terms of running time.

Control strategies are represented in different ways. One popular approach is to attach so-called confidence measures to alternative rules. This strategy looks for the most relevant rule in a given situation. If successful, it eliminates rule application ambiguity and reduces the aforementioned exponential time dependency to a linear one.

Another widely used approach is to break down the total set of rules to a relatively large number of small separate rule subsets. The idea is that an expert system will select a relevant rule subset and then look for the most relevant rule within this subset. Selection of the relevant rule subset is usually guided by special control rules that are sometimes called meta-rules. If it is successful, this strategy reduces the linear time dependency to the logarithmic one.

No matter what control strategies are used in expert system development, the chances to have them built in an expert system shell are very slim. The reason is clear: The expert system shell is, by definition, application independent, whereas a control strategy is essentially application specific. Another very important lesson can be found here:

Lesson 3. *An expert system shell should provide end-user-oriented facilities for easy incorporation of control strategies. A shell having no such facilities makes developing an efficient commercial expert system impossible.*

What about shell price?

Going back to the case story, it turned out that the expert system shell that Genesis used did not allow the developer to incorporate any control strategies. The company selected the wrong development tool. Ignorance was not the only reason for this choice.

Another reason was the cost of expert system shells. Remember, Genesis was to develop a high-volume, relatively inexpensive expert system. Obviously, the expert system shell had to be even less expensive. With the final product targeted for the $200 to $300 range, Genesis had to find a shell for about $40 to $50 per copy. Therefore, the price of many, if not most, commercially available shells was prohibitive. It would seem that Genesis had two options:

- It could purchase a relatively inexpensive expert system shell with development and runtime environments available separately and negotiate the required price for the runtime environment at the time of purchase.
- It could develop a proprietary expert system shell in-house.

SPECIAL measures aimed at achieving an increasing scope of expertise in accordance with efficiency requirements should be taken; otherwise, scope of expertise and running time will be conversely related.

Unfortunately, Genesis chose a third option. It purchased a $39.95 expert system shell developed by an obscure hacker operating from a boat in Sausalito. The shell had no documentation, no support and, of course, no facilities for incorporating control strategies. Therefore, when the system's developers encountered the efficiency problem with the 500-rule prototype, they had nowhere to go.

Certainly, this choice was the worst possible, and the company learned its lesson.

Lesson 4. *Never use expert system shells that are not supported commercially. Deal only with vendors that are committed to providing high-quality service.*

Why not build your own?

One interesting question remains to be addressed. How much could Genesis have done if it had followed one of the first two options?

Let us first consider the second option — developing a proprietary expert

system shell. Generally, I am opposed to developing proprietary tools, especially simultaneously with applications. This is as bad as developing a larger Pascal program in parallel with developing the first Pascal compiler.

There is at least one excellent account of a commercial expert system that shows why developing a proprietary tool is not a good idea.

The system in question is the Dipmeter Advisor, a famous Schlumberger Ltd. expert system that processes measurements from a dipmeter tool to interpret signatures, or layers, of geological events. The history of its development has been described in Reid Smith's paper, "On the Development of Commercial Expert Systems."

In some respects, this history illustrates how *not* to develop commercial products. The Dipmeter Advisor project was run as a research venture; hence, it was driven by designers' interests rather than by the objective to build a cost-effective commercial product.

Not incidentally, the whole project cost Schlumberger about $21 million, and it required three generations of designers to develop it.

Of course, a number of reasonable excuses can be found. The Dipmeter Advisor was only later converted to a commercial project. It was begun in 1980, at a time when neither expert shells nor good runtime hardware existed. Not surprisingly, the Dipmeter Advisor developers jumped from Digital Equipment Corp. Decsystem-20 to VAX-11/780 to Xerox Corp. 1108 machines and from Interlisp to Franzlisp to Interlisp-D as implementation languages.

One thing I find hard to excuse is Smith's hypothesis of "oscillating focus of attention in commercial expert system development." According to this hypothesis, the application development stage should alternate with the stage of expert system tool development.

This may be a good idea for research into the next generation of expert system shells and knowledge-representation environments; however, it is absolutely wrong for commercial expert system development.

Not only are many companies developing expert systems, but few of them possess the experience to develop expert system shells. In the process of developing applications, these companies allow their development efforts and monies to get sidetracked by tool development — to the detriment of the application.

Oscillating application and tool development disrupts the whole project. It can make project management very difficult, significantly reducing chances of meeting established deadlines and developing a product in a cost-effective fashion. In fact, providing enough redundancy to develop a variety of diverse and evolving applications, instead of oscillating between application and shell development, is a single major justification for today's general-purpose expert system development environments.

Now we can expand on Lesson 4 as follows:

Lesson 5. *Never develop your own expert system shells if you can find a commercial one that is adequate for your application. It may be much easier to tailor an existing tool to your needs than to develop a new one from scratch.*

The time for proprietary tools

Some notable exceptions to this lesson do exist:

One exception is when there is no commercially available expert system shell adequate for an application. One example of this is the development of a proprietary expert system shell by Applied Expert Systems, Inc. (Apex) in Cambridge, Mass.

In 1983, when Apex's Planpower financial planner software project began, no commercial frame-based development tools were available on Xerox 1100 LISP machines, so Applied Expert Systems had to develop its own. At the time, Xerox's Loops, a hybrid knowledge-representation environment, was available only as a prototype.

Another exception would occur if a commercial expert system development environment is available, but a cost-effective runtime environment is not available. Again, Apex is a good example of this. Loops is excluded because it lacks not

only commercial support but also a runtime version.

A third exception is a case in which a proprietary expert system shell results from many years of previous research and development so that it actually appears as enhancement and commercialization of an existing tool. An example is Syntel, a proprietary expert system shell developed by Syntelligence, Inc.

Many Syntel features were derived from SRI International's research on Prospector, a computer-based consulting tool for mineral exploration. Most Syntelligence founders and Syntel developers came from SRI.

Lastly, an exception could be made when an application is targeted for high-volume sales and should be so inexpensive that there is no way to find an affordable expert system shell on the market.

Although this can formally stand as a reason for developing a proprietary expert system shell, this situation is not one that occurs often. In any event, I would recommend trying a programming language, such as LISP or Prolog, before making any commitment to developing a new tool.

COST-EFFECTIVE runtime environments are a problem for commercial expert system development. The problem becomes critical if you are to choose a high-level development tool: The price may be high, and it is paying for things that are hardly needed at execution time.

Employing a staff of AI professionals who are experienced in tool development is a must. Schlumberger, Apex and Syntelligence all have first-class expert system shell developers.

In my case story, I do not believe that Genesis could meet this requirement. Remember, the company staffed experienced conventional programmers rather than AI tool developers.

Although both Apex and Syntelligence have been successful in expert system shell development, I would recommend that all expert system developers avoid developing their own tools for as long as possible.

There is little to say about Genesis's first option: to purchase a relatively inexpensive expert system shell and negotiate a proper price for the runtime environment at the time of the tool's purchase. Genesis needed a cost-effective runtime environment, that's all.

The following lesson is one that is very important:

Lesson 6. *A critical part of shopping for an appropriate expert system shell is finding out whether it has a separate runtime environment and how this environment can solve your runtime problems.*

The ideal solution to one's runtime problems would probably be a cross-compiler that could compile the expert system code written in an AI language, such as LISP, into a conventional programming language of one's choice. This choice could be dictated, for instance, by a specific conventional software to which one's expert system should be hooked up. Unfortunately, all expert system shells that I am aware of do not have such cross-compilers.

Indeed, many expert system shells have interfaces to one or more conventional programming languages so that the expert system can call programs written in those languages.

Although this feature is very important, it does not really help to execute the expert system cost-effectively and efficiently in runtime.

Cost-effective runtime environments are a big problem for commercial expert system development. The problem becomes critical if you are to choose a high-level expert system development tool: The price may be high, and it is paying for things that are used during development and are hardly needed at the execution time. Look for the solution of this problem *before* you buy the expert system shell, not after.

Lessons learned

Users interested in developing expert systems of their own should take heed of the following lessons:

- The scope of an expert system's expertise and its running time are equally important to the system's performance.
- Unless a system's scope of expertise is increased in accordance with efficiency requirements, its scope of expertise and its runtime will be conversely related.
- An expert system shell should provide end-user-oriented facilities for easy incorporation of control strategies and should be supported commercially.
- An expert system shell should never be developed if a commercial one can be found that is adequate for the application.
- A critical part of shopping for an appropriate expert system shell is finding out whether it has a separate runtime environment and how this environment can solve runtime problems.

The story of Genesis's struggle to develop an expert system shows that selection of a proper expert system shell can be critical to the success of an expert system development project. To handle this process properly, users should know much more than what they glean from vendor advertisements and promotional literature. •

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The politics of technical writing

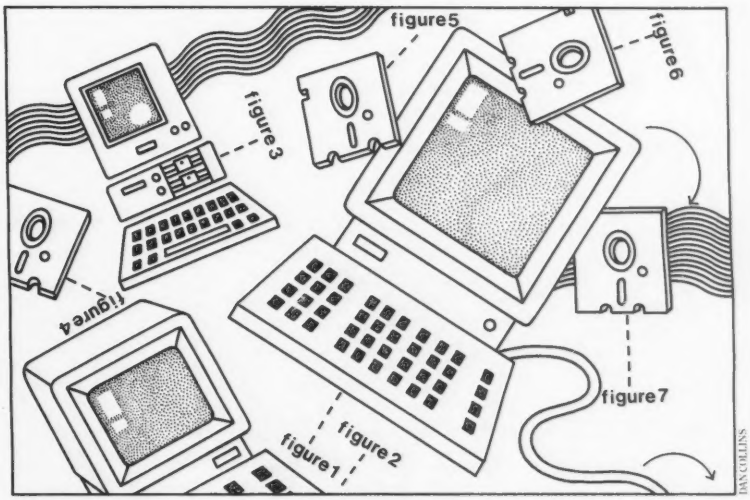
BY PAULA BELL

Publications, especially those written in support of software, are most often reviewed as part of the products they describe. Good publications contribute not only to the product image but also to the company operations by decreasing the need for maintenance and hot-line calls.

Unfortunately, company efforts to improve publications often fail, because technical companies tend to take the technical view: They expect a writer to act as a straight line of communication from source — the development staff — to destination — the user.

Along the line somewhere, schedules are to be set and reset according to the performance of technical development, and when the product is ready to enter production, a set of glossy publications will accompany it.

The problem with the technical view is that the technological wonders of desktop publishing do not automatically produce good publications. Publications are produced by people, and where there are people, there are politics. To supply the best documentation in the time allotted, the company must rely on a top-down network of people — each group a constituency, each individual a political entity. At each level of this hierarchy, the principles of Murphy's law come into play.



Top dogs

At Leading Etch Corp., the vice-president of marketing, a self-made man who was proud of his handiwork, didn't think that writing was important to the success of his product until he received a letter from State of the Art, Inc.

"If you are so careless about the quality of your correspondence," the letter's author said, "then I am too concerned about the quality assurance checks throughout your company to agree to this contract." In the envelope, along with an unsigned contract, was a red-lined copy of the vice-president's letter to State of the Art.

Though many decision makers would not recognize a grammatical slip or sloppy punctuation — and those who do would not generally take the time to write about it — their judgments of another company, at all levels, can be influenced by the written word.

As is true of the success of most company projects, the impetus for good documentation must come from the top.

Executives must be convinced that professional publications are significant to the quality of the company's image and must transmit that conviction to the people who can contribute.

In order to bridge the credibility gap and pay more than just lip service to the need for effective communication, memos and announcements from the top must be well written.

A comma splice or dangling modifier might seem to be a fussy detail, but good engineers and programmers know the importance of detail in their own work; details are equally important at the top.

Because examples of poor executive prose abound, the prose is often parodied. Well-written documents, whether issued directly from the powers that be or filtered through a competent secretary, establish credibility. Executives who practice what they preach will be able to lead more disciples to the cause of good writing.

The governors

At the Salem Kindling Co., project postmortems often end up as witch hunts. Managers who have forgotten to take into account all the support needed — such as the inclusion of publications in the schedule — to turn out a quality product end up pointing fingers at each other for the oversights. Hard feelings from one project carry over to the next.

Management time spent defining the interactions between people is as important as time spent defining the interfaces of the product. Although no one would want to compromise the publications because of untested information or inadequate editing time, too many managers fail to see beyond the traditional party lines of product development

Bell is manager of technical publications at Silicon Compilers, Inc. in San Jose, Calif.

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and support.

Of course, some people in the organization are more critical to the product than others, but resource rights need to be parceled out to all and renegotiated in times of conflicting goals. Ignoring all but the development staff leads to resentful employees who are less able to concentrate on the task at hand after losing face.

For publications to be accurate, timely and reflective of a professional company image, the people who directly and indirectly contribute to a product's success must negotiate at all stages of the product life cycle. Discussions about the kinds and numbers of documents that the product will require should start with the initial planning of the project.

Immediately thereafter, technical writing should begin, at least on a part-time basis. Although it is possible that having writers get close to a product design can sometimes compromise their view of what the users will need to know, the risk is negligible when compared with the benefits of their understanding how the product will work.

ALTHOUGH a few technical people are superb writers, most are not. Managers who assign development personnel to documentation tasks run the risk of second-rate publications at the expense of full-time development — a double bind.

Publications that evolve with repetitions of design phases, sudden shifts because of technical difficulties, reworking of unworkable features, multiple reversals, large and small, are the better for being a part of the process.

Ditto for the writers who get a stronger grounding in their subject matter and the developers who are able to concentrate more on the design and less on its documentation. Mutual respect for one another's expertise very often results from this process and makes the next project easier to manage.

Few good products go out the door without a page of last-minute release notes, covering from the time the publication went into print until the tape is shipped or the last nail is pounded into the shipping crate. Project, program and departmental managers who consider all facets of product success should include publications in their schedules from beginning to end.

Conflict of interest

At Barnes and Fields, much of the writing is farmed out. This contract work is cheaper, in these times of shrinking budgets, than employing full-time writers. The quality of the writing is uneven, however, depending on the availability of competent contractors and the amount the company is willing to pay.

At Matrix Machines Corp., all writing is done in-house, with each major development project including one team member responsible for documentation. The quality of the writing among projects is uneven, especially when engineers who think they are writers are not and when engineers who do not want to write are forced to do so.

Whether managers in charge of technical writing decide that their writing staff will be predominantly contract or captive, distributed or consolidated, they must be sure that all writers have basic writing skills.

Some technical types have written not only technical articles but everything from poetry to science fiction. These people are to be encouraged, as their input generally needs only light editing and clarification. However, the scope of their contributions should not expand to the detriment of their technical tasks.

Just as an engineer must understand material properties or a systems programmer must understand console modes, a competent technical writer should understand how to use rhetorical devices to achieve the most elegant and proper solutions. Understanding grammar, its use and structure, is basic to all good writing. Since most technical writers are learning with each new assignment, there's no time to be learning the basics, too.

Although a few technical people are superb writers, most are not. Managers who assign development personnel to documentation tasks run the risk of second-rate publications at the expense of full-time development — a double bind.

Rank and file

At Wild Blue Yonder Spacecraft, Ltd., the program developer sees no good reason to waste time with a tech writer when the way the product works is totally evident from comments in the code. The design engineer, meanwhile, has become immersed in the next project, which is much more interesting one and will give him better visibility. How is the writer to make contact?

In addition to rhetorical skills, technical writers need to interact effectively with many types of highly professional personnel: engineers, programmers, mathematicians, technicians and management throughout the company.

In *The Psychology of Computer Programming*, (Van Nostrand Reinhold, 1971), Gerald Weinberg makes this observation:

"The users have a right to expect that

the documentation be done as professionally as the programming. And considering the matter coolly, there is no reason to believe that a professional programmer will be qualified as a professional documenter. . . . If documentation is elevated to a professional status all its own, so that the documenter can work side by side with the programmer without being made to feel inferior, we have the right to hope that documentation will improve."

Although WYSIWYG, windows and mice have certainly led to better looking publications, documentation content has not improved dramatically since 1971, when Weinberg wrote the above evaluation, fully realizing later that he was describing a political climate:

"And so, when we speak about computer program documentation, we are not speaking about the psychology of computer programming at all, except insofar as programmers have the illusion that anyone can do a good job of documentation, provided he is not smart enough to be a programmer."

The competition

But many developers and writers still do not realize the commonality inherent in their two disciplines. The most important techniques of designing quality products — that is, coherent logical structure and strict adherence to detail — apply equally to writing.

"How strange it is," Samuel Florman muses in *The Existential Pleasures of Engineering* (St. Martin's Press, 1975), "that the antitechnologists . . . who readily accept the behavior of leopards and vultures are repelled by the idea that man, for all his angelic qualities, is self-seeking and competitive."

On every development project, no matter how dedicated, everyone must compete for the most limited of resources: other people's time. One way to save time is to agree on common terminology early in the project.

Since no one has yet written *The Existential Psychology of Technical Writers*, it is primarily the writer's job to understand developers who run the gamut from polished presenters to those who can barely speak English.

Because most people on one project generally have not come from the same company, the writer cannot assume that a specific technical term is standard without checking with at least two other people in the same discipline, preferably from different companies. Their mother-company cultures, as well as their diverse disciplines, add spice to the political stew.

Everybody must agree on terms and use them in all documentation, from electronic mail memos through publication release. This is the only way to ensure consistency, a quality that is not only a sure gauge of the final publication but also a positive aid to internal communication.

The producers

At Xoxix X-Ray Equipment, everyone in the company wants to get into the act.

The production department is threatened and cajoled by marketing to get the glossies out, by technical pubs to get the manuals copied, by training to get the slides inked and by the president to get the latest version of his speech re-typeset.

Production issues must be talked out until responsibilities are assigned for setting quality standards, establishing priorities with enough flexibility to handle crunches and designing tracking systems to monitor both.

MIS-ing persons

At The Fast Lane Corp., the company system goes into gridlock when a manual is due. If the company had purchased independent desktop publishing of some form for its technical publications department, the problem would be minimal. However, this department uses a distributed system that is shared throughout the company, and MIS involvement in documentation application support is almost nonexistent.

When writers are part of a network of computer users, a good relationship between publications and MIS operations is critical. The systems administrator must understand what the system's editing and text formatting software does in order to help the writers tailor the system's writing tools to their needs and to troubleshoot the inherent or resultant bugs.

The writers must visit the operations facilities and get an idea of its equipment and complexity in order to help in the MIS bailiwick. By understanding how much of a strain a multivolume document puts on the system, the peripherals and especially

on the other users, writers can learn to give advance warning to everyone concerned. MIS and publication managers who are aware of each other's needs and who meet regularly can keep automated and human systems running with fewer glitches.

Training wheels

At Convergent Compilers Corp., the company training department and the technical publications department report to the same branch in the organization chart. They could benefit from each other's research; instead, they operate independently and redundantly — and their customers are confused.

Coordinating training materials with the documentation effort can only improve both, and there's nothing strange about the two departments becoming bedfellows. They share the common goal of teaching something that someone needs to know. They can share the work load, too, especially in development of concepts and illustrations. It's essential that they share a common dictionary of terminology.

Their constituencies do diverge in the formalisms of presentation. But the more the manuals support the training as reference material, the more the training can help users recall the information in the manuals.

WHEN THE draft appears on time but as clean as it went out — except maybe for a typo or two that the reviewer has spotted — the reason is most likely not a perfect manual but rather a reviewer whose manager has not made it clear that publications are important.

Raving reviewers

At all companies, the politics of documentation can become especially heated during review cycles, when publication drafts must be critiqued by developers, marketing staff, customer service personnel, quality controllers and lawyers, any or all of whom won't agree with parts of the publication or with each other and few of whom will acknowledge limits to their critical ability.

Review drafts must be prepared, distributed, collected and incorporated into a single draft before final editing and production can begin.

The distribution list attached to the draft can also serve as a sign-off sheet. A sheet of instructions should be attached, telling the reviewers what is expected of them in terms of time and types of corrections and highlighting any parts of the publication that are still incomplete. Reviews should act as a check not only on what is there but also on what is missing.

To avoid anarchy, revolution and territorial imperatives, a strategy must be devised to mediate among the following:

- Reviewers who return copies late, untouched or not at all.
- Marketers who sometimes learn from the review draft that features they were touting didn't make it into the product after all.
- Managers who have published articles — generally very heavily edited — in trade journals and decide the tone of the manual is somehow wrong.
- The company lawyer, who has just discovered that the product name has already been registered by another company in the same industry.

The primary rule in this strategy is *allow no surprises.*

There is always time to give everyone responsible for signing off the final review draft a preliminary view of its contents.

The second rule is *review the review.*

When the critical draft has not been returned within the specified time, it is generally the writer's responsibility to track that draft down, often to the bottom of a pile of program listings or engineering drawings.

When the draft appears on time but as clean as it went out — except maybe for a typo or two that the reviewer has spotted — the reason is most likely not a perfect manual but rather a reviewer whose manager has not made it clear that publications are important by providing the perqs to prove it.

Previewing the final draft, fixing a firm date for its return, tracking it by reminders and rewards and applying quality assurance measures before it is cast in concrete are the ways to make a review culminate in a good publication.

Everybody wins

Good publications speak well for the companies that view the written word as a significant contributor to the company image. If a company's publications do not work well, then its customers may never find out how really well the product works.

Good publications can be produced only when everyone in the organization remembers that everyone else is subject to the same pressures.

Good publications are good common sense. They make the job easier for everyone — the prospective customer who needs data to make a buy decision, the marketer or salesman who needs every selling tool available, the developers and service personnel who must maintain the system, the writer who will be writing more about the same product or others like it and the end user who will spread the word, good or bad. •

MANAGEMENT

TAKING CHARGE

Mark Duncan

Glamorize maintenance

Since existing application software may be likened to company assets, when something goes wrong the whole company can be affected, not simply the data processing department that maintains the program code. Therefore, maintenance must be regarded as a business issue. The highest levels of both data processing and user department management should develop a keen awareness of the impact of maintenance activities, and they must do more than support it, they must plan for it.

Maintenance should no longer be regarded as something less significant than development. It must be elevated to share an equal position with development. An organization should certainly maintain commercial competitiveness through new and effective computer automation. But when new automation grows old, longevity and client credibility will only be achieved with an established and successful maintenance program.

Generally, an application spends more of its life being maintained than it does being developed, which suggests that perhaps maintenance should be considered more important than development. But this is

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Firm taps Mac for strategy move

BY JEFFRY BEELER
CW STAFF

SANTA BARBARA, Calif. — When Kinko's Copies Corp. began equipping its outlets with microcomputers and using them to deliver desktop publishing services, the company did a lot more than simply diversify its business.

Without realizing it, the nationwide chain of walk-in photocopying shops was also providing a textbook example of how corporations systematically mature in their ability to recognize and exploit information technology as a competitive weapon.

In adopting systems, most organizations unwittingly follow a two-stage learning curve, according to Jack Nilles, information technology program director at the University of Southern California's Center for Futures Research.

During the first stage, companies typically apply high technology to existing procedures in the hope of brightening their profit picture by boosting productivity or slicing costs, Nilles said. In short, they initially limit their use of computing systems to tasks they already do.

As their experience in using the newfangled technology grows, however, firms gradually awaken to its other possibilities and begin adapting it to enterprises they have never before tried, Nilles continued. During this second phase of the learning curve, they use systems expertise not only to save money but also to make it, either through diversification or expansion to new geographical markets.

A striking illustration of how corporations can tap additional revenue sources by shrewdly using information technology is Kinko's Copies' move in 1985 into desktop publishing, Nilles said.

Founded in Santa Barbara in 1970, Kinko's Copies originally viewed itself strictly as a document-reproduction service for students and businessmen who needed fast, high-quality photocopiers but lacked immediate access to them. But with time, the company's definition of its corporate mission broadened as it felt a growing urge to enter an allied but substantially different line of business. By the early 1980s, Kinko's Copies resolved to continue duplicating documents but also begin creating them as well.

"At the time, no one was offering a low-end alternative to typesetting in the document-duplication market," according to Charley Williams, vice-president of marketing for Kinko's Service Corp., the photocopying chain's support arm.

To capitalize on what it considered an emerging business opportunity, the firm began to install typewriters in its copy shops and flirted with a number

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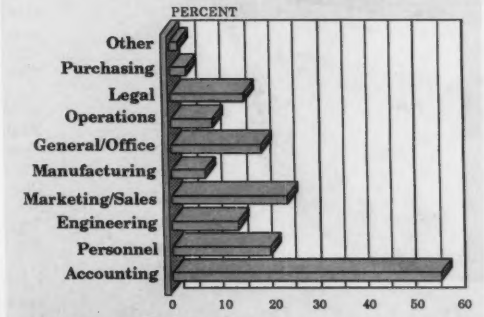
Data View

Corporate departments targeted for automation

1986 survey of Fortune 500 MIS directors



INRORMATION PROVIDED BY SIERRA GROUP
CW CHART: MITCHELL J. HAYES

Telecom salaries jacked up

BY DAVID A. LUDLUM
CW STAFF

Starting salaries for telecommunications managers this year are growing more than twice as fast as those for other information systems positions, according to an annual survey.

Starting salaries for telecommunications managers in large data processing installations are rising 15.4% while those in medium-size shops are growing 17.1%, according to an annual survey by Robert Half International, Inc.

The survey is based on starting salaries for personnel sought through the nationwide offices of the recruiting firm, which has followed data processing pay levels since 1950.

Most jobs at large installations — characterized in part by a professional staff of 50 or more — show gains of 5% to 8%. The second-largest increase is 9.5% for systems and programming managers.

Most jobs at medium-size installations, those with 15 to 49 professionals, and small shops, with fewer than 15 professionals, show increases of 2% to 6%. The second-largest gain for positions in a medium-size shop is 8.5% for programmers.

The big premium in increases for telecommunications managers reflects their scarcity, in re-

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Firm taps

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of other noncomputerized means of producing original documents. However, as personal computers increased steadily in acceptance and sophistication, Kinko's Copies abandoned its earlier choices and embraced desktop publishing as the prime vehicle for pursuing its planned expansion.

The idea for placing desktop publishing systems in its stores took shape collectively in the minds of a small team of Kinko's Copies managers that included Williams and Ed Togami, vice-president for technology at Kinko's Service.

At first, Kinko's Copies considered implementing its desktop publishing systems on IBM Personal Computer clones. But acting primarily on Togami's advice, the organization opted instead to build the service around the Apple Computer, Inc. Macintosh.

KINKO'S Copies' desktop publishing services come in two flavors, including a do-it-yourself variety in which customers rent time on a Macintosh and create their own documents without help from the company's employees.

Having been a Macintosh user himself since 1984, Togami was especially smitten with the machine's user interface, which he found much easier to learn than its Microsoft Corp. MS-DOS counterpart and, therefore, more suitable for nontechnical customers. "Ease of use was a key consideration in our recommendation about what computer model to install out in the field," Togami recalled.

Kinko's Copies' desktop publishing services come in two flavors, including a do-it-yourself variety in which customers merely rent time on a Macintosh and create their own documents without help from the company's employees. In configuring its desktop publishing systems, the firm needed a microcomputer that required as little user training as possible, Togami said.

Another reason Togami, the support firm's chief MIS executive, favored the Macintosh over IBM-style PCs is that it allows customers to turn their finished documents into output that is high in quality — and thus readily reproducible — using Apple's Laserwriter printer.

During the nearly two years since it went into operation, Kinko's Copies' desktop publishing service has found its way into almost a third of the company's roughly 300 photocopying outlets, Togami said.

Although document creation currently accounts for only about 1% to 2% of the chain's total business, executives of the corporation expect the share to climb to as high as 10% within two years, Williams said.

CALENDAR

FEBRUARY 22-28

Electronic Printing Systems/Directions in Digital Imaging Conference. Miami, Feb. 22-26 — Contact: Electronic Printing Systems, Directions in Digital Imaging, Suite 1, 1855 E. Vista Way, Vista, Calif. 92084.

1987 User Group Conference. Marina del Rey, Calif., Feb. 22-25 — Contact: Trax Software, Inc., 10801 National Blvd., Los Angeles, Calif. 90064.

Automating Systems Analysis and Design. St. Paul, Minn., Feb. 23-25 — Contact: Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138. Also being held in Des Moines, Iowa.; Lansing, Mich.; Austin, Texas; Toronto; Boston; Kansas City, Mo.; and Toledo, Ohio.

International Operational Data Security Workshop. Stamford, Conn., Feb. 23-26 — Contact: Information Security Associates, Inc., 350 Fairfield Ave., Stamford, Conn. 06902. Also being held March 9-12 in Houston, April 27-30 in Toronto, May 18-21 in Orlando, Fla. and June 1-4 in Minneapolis.

The National Local-Area Network Conference. Washington, D.C., Feb. 23-26 — Contact: Ken Burroughs, Capital Communications Group, Inc., 3825-I South George Mason Drive, Falls Church, Va. 22041.

Exchange Carriers Standards Association Technical Subcommittee T1Q1. Orlando, Fla., Feb. 23-27 — Contact: Radisson Plaza Hotel Orlando, 60 S. Ivanhoe Blvd., Orlando, Fla. 32804.

IBM: Mastering the Transition 1987-1992. New York, Feb. 24-25 — Contact: The Yankee Group, Seminar Division, 200 Portland St., Boston, Mass. 02114.

Competing With Computing. Dallas, Feb. 24 — Contact: Education Registrar, Nolan, Norton & Co., One Cranberry Hill, Lexington, Mass. 02173.

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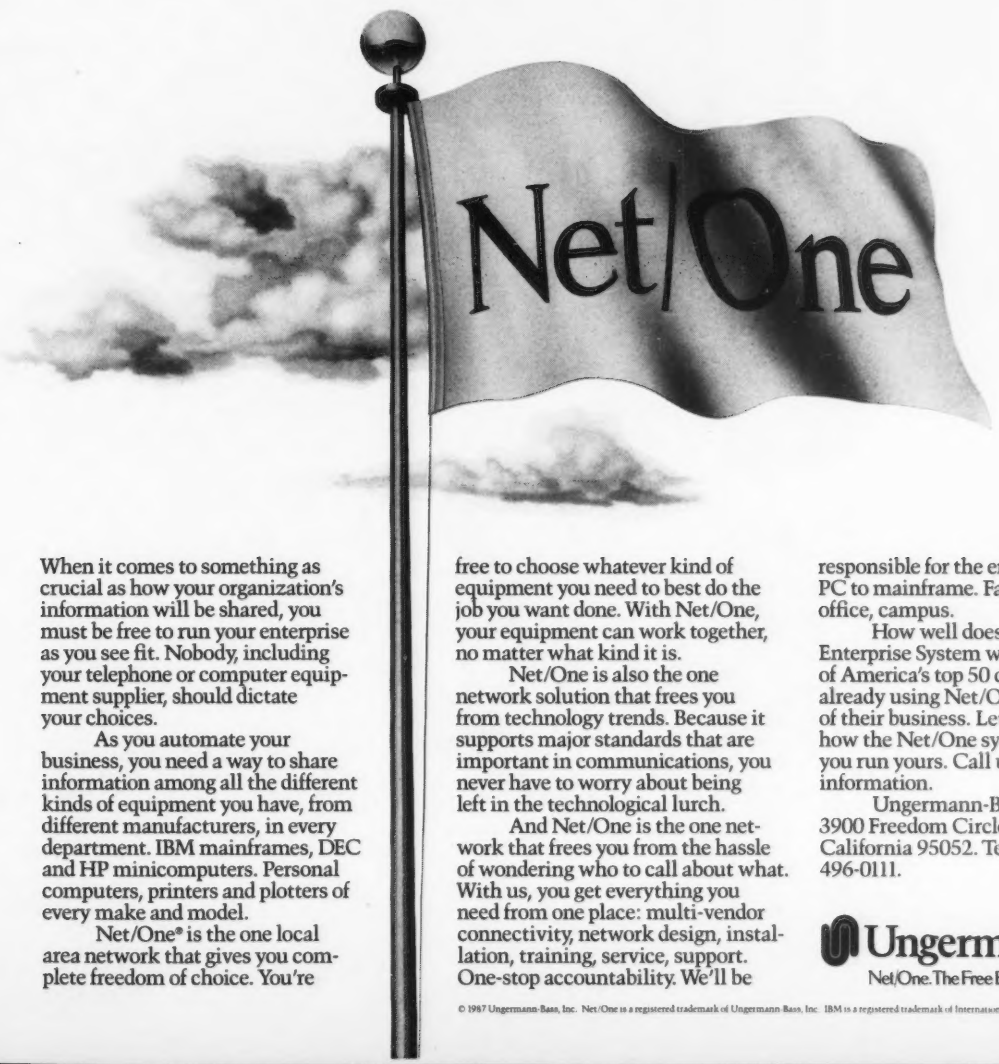

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Glamorize

FROM PAGE 69

not so — it is not a case of one being more important than the other. It is a case of both functions being given due attention at the proper time. A good maintenance program will improve the development life cycle, and a good development life cycle will reduce maintenance efforts.

Since maintenance demands a large portion of the data processing budget — and will probably demand even more in the future — management must recognize that it needs maintenance specialists.

These creatures are not the same as development programmers who occasionally perform maintenance. They are a breed apart; they have substantial knowledge of many applications and their interfaces as well as a greater awareness of the impact on users and the company's business if things go wrong.

In other words, maintenance programming is a career, and data processing management must acknowledge it as such. Maintenance programming should be offered as an equal alternative to development programming. An individual choosing it as a career should feel reassured that time, money and training will be expended on the maintenance staff with the same generosity as it is on development teams.

Data processing management must acknowledge that there are such things as maintenance skills and that these skills are not necessarily the same as development skills.

Acquiring skills

Furthermore, acquisition of the skills differs. Whereas funding for development education and training seems to be an automatic budget consideration, the same is not true with maintenance. There seems to be an inexplicable expectation that people magically become maintenance programmers simply by being assigned that title or responsibility.

Time must be formally allocated for mastering existing applications. Through this training, maintenance programmers will develop a confidence that prevents software corrections and modifications from being a hit-or-miss activity.

There is no denying that to be successful, both development and maintenance programmers must be technically competent. Furthermore, technical skills are common to both activities: development and maintenance programmers must have the ability to write, test and debug code, they must have analytical and documentation skills, they must be knowledgeable about their hardware and software and so on.

Development and maintenance programmers also require a number of nontechnical skills.

MAINTENANCE programming is a career, and data processing management must acknowledge it as such.

However, the nature of maintenance tends to demand these nontechnical skills to a greater degree than does development.

These nontechnical skills and their importance to maintenance include:

- Initiative, due to time constraints and lack of procedures.
- Self-sufficiency, because work is often vaguely defined and done alone.
- Versatility, because in many cases several applications must be understood.
- Flexibility, because projects may have many aspects and grow in scope.
- Meticulousness, due to unfamiliar code and applications.

This is not meant to suggest that a particular skill is unique to either development or maintenance. In fact, the more overlap there is, the better, for it will draw the activities closer together, making maintenance more like extended development.

Despite a plethora of productivity aids and tools to make the development process faster and more streamlined, maintenance activities are going to claim the emphasis in data processing departments of the future. Whereas development is invariably optional, maintenance is mandatory.

The current obsession with quality in the context of application development is a clear indication of data processing management beginning to take maintenance seriously.

Fact of life

However, there will never be perfectly developed software, so maintenance will always be a fact of data processing life. And for that reason, maintenance programming needs to be accepted for the important function it is. The perception has been that a development project is somehow more visible than a maintenance project, yet it is maintenance work that interrupts development, not the reverse.

Data processing management needs to glamorize maintenance activity in order to attract programmers with genuine interest in, ambition for and dedication to the function. An easy first step would be to ban the word maintenance itself, as it carries with it connotations that stem mainly from what development is not, rather than from what maintenance is.

Instead of maintenance, why not say extended development or even complementary development. Instead of maintenance programmers, we could have system troubleshooters or a dynamic support group.

Cosmetic changes will help, but only when data processing management begins to concern itself less with the romance of development and more with the reality of maintenance will the latter receive the recognition and attention it legitimately deserves.

Duncan is a systems analyst in the Quality Assurance section of a major Dallas bank.

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Telecom

FROM PAGE 69

lation to demand, and an effort to raise the salaries to the level of other information systems managers, according to Joan Gable, manager of Robert Half's data processing placement department.

"There are not that many of them out there. It's a relatively new position," Gable said, adding that some companies are replacing telecommunciations consultants with full-time employees.

The average salary reported for large-shop telecommunications managers is $45,000. That compares with $60,000 for data base managers, $47,000 for technical services managers and $46,000 for systems and programming managers.

The average salary reported for telecommunications managers at medium-size shops is $41,000, which compares with $42,500 for technical services managers, $41,000 for systems and programming managers and $39,000 for data base managers.

New managers

New telecommunications managers tend to have at least a year of experience in that field, according to Gable.

While an MIS director who came up through the data processing ranks might be able to bring most of his new managers up to speed through his experience, he probably cannot do so for his new telecommunications manager, Gable said. Employers do not consider managers as transferable among technical areas as they once did, she added.

The demand for telecommunications experience extends to small, personal computer-oriented shops, Gable noted. "It's getting down to even the micro shops. People who have PCs are looking for someone who has modem experience," she said.

Filling jobs

College students increasingly specialize in telecommunications; in the long run those who have done so will fill many telecommunications jobs, Gable said.

Among large installations, starting salaries for 16 of the 23 data processing positions listed are up between 5% and 8%.

The others with larger gains are operators at 8.8% and operations managers at 8.6%. Positions with smaller increases are telecommunications specialists at 4.2%, programmer analysts at 3.3%, data entry operators at 1.6% and I/O clerks at 1.3%.

Among the 22 jobs listed for medium-size installations, all the others show gains of between 2% and 6%, except I/O clerks, which registered no change.

For small installations, the 11 positions listed show gains of 2% to 6%, except MIS directors', which rose 6.5%, operators', which rose 6.3%, and programmer analysts', which rose 1.8%. I/O clerks showed no change.

The survey notes that starting salaries can vary significantly on the basis of an individual's experience with specific technology and applications.

To compensate for geographical variations, the survey provides figures for adjusting average salaries by state. It also suggests adding 5% for jobs in cities of one million or more people. However, these variations do not apply to salaries of $50,000 or more.

Among the states for which salaries should be adjusted upward are California, Massachusetts and Connecticut (5%); New York (4%); Illinois and Michigan (3%); New Jersey and Washington (2%); and Minnesota (1%).

Among those for which they should be adjusted downward are Maryland, Ohio and Texas (1%); Virginia (2%); Colorado (3%); Georgia (4%); North Carolina (8%); and Arizona and Florida (9%). Pennsylvania is among states with average salaries.

Continued from page 70

Computer Aided Software Engineering Symposium. Atlanta, Feb. 24-26 — Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

Third Annual Champs Users' Group Meeting. Crystal River, Fla., Feb. 25-27 — Contact: SCI Software, 1255 N. Vantage Point Drive, Crystal River, Fla. 32629.

Phoenix Conference on Computers and Communications. Scottsdale, Ariz., Feb. 25-27 — Contact: Arizona State University, College of Engineering and Applied Sciences, Tempe, Ariz. 85287.

Introduction to EDP Performance/Capacity Management. Phoenix, Feb. 25-27 — Contact: Applied Computer Research, Inc., P.O. Box 9280, Phoenix, Ariz. 85068.

ICIA '87/Commtex International. Atlanta, Feb. 25-28 — Contact: International Communications Industries Association, 3150 Spring St., Fairfax, Va. 22031.

X/Open Demonstration of Portability. Luxembourg, Feb. 26 — Contact: Christina Davis, X/Open Office, Sterling Public Relations, 1 Chelsea Manor Gardens, London, England SW3.

MARCH 1-7

Second International Conference on CD ROM. Seattle, March 2-3 — Contact: Microsoft Corp., Box 97017, 16011 N.E. 36th Way, Redmond, Wash. 98073.

Seventh Annual Computer Operations Conference. New Orleans, March 2-5 — Contact: Association for Computer Operations Management, Suite 201, 11501 Brookhurst, Garden Grove, Calif. 92640.

Eighth Annual Conference on EDP Performance and Capacity Management. Phoenix, March 2-6 — Contact: Applied Computer Research, Inc., P.O. Box 9280, Phoenix, Ariz. 85068.

CICS/VS Command Level Programming Course. Edison, N.J., March 2-6 — Contact: Branch Manager, Suite 207, One Metroplaza, Edison, N.J. 08837.

Corporate Electronic Publishing Systems Show and Conference. Chicago, March 3-5 — Contact: Cahners Exposition Group, 999 Summer St., Stamford, Conn. 06905.

DEXPO Europe '87. London, March 3-5 — Contact: Expoconsul International, 3 Independence Way, Princeton, N.J. 08540.

Securicom '87 Congress on Computer and Communications Security and Protection. Paris, March 4-6 — Contact: Securicom-Sedep, 8 rue de la Michodiere, 75002 Paris, France.

Data Communications Network Management. Boston, March 5-6 — Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810. Also being held April 30 to May 1 in Seattle.

Taxation of Intellectual Property. Chicago, March 5-6 — Contact: Deborah Gordon Public Relations, Inc., 320 N. Michigan Ave., Chicago, Ill. 60601.

MARCH 8-14

Cullinet Applications and End-User Computing Conference. Dallas, March 8-10 — Contact: Cullinet Software, Inc., 400 Blue Hill Drive, Westwood, Ma. 02090.

Continued on page 77

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Continued from page 75

Spring 1987 Conference of the North American Honeywell Users Association. Charleston, S.C., March 8-13 — Contact: NAHU, Inc., P.O. Box 2037, Willingboro, N.J. 08046.

CICS/VS Internal Structures & Control Flows. Atlanta, March 9 — Contact: American Data Group, Inc., 1770 Indian Trail Road, Norcross, Ga. 30093. Also being held May 11 in Philadelphia.

Automated Manufacturing: Computers, Communications and Controls in the Factory. St. Petersburg Beach, Fla., March 9-10 — Contact: Frost & Sullivan, Inc., 106 Fulton St., New York, N.Y. 10038.

New Technologies. Beverly Hills, Calif., March 9-10 — Contact: Seybold Seminars, 6922 Wildlife Road, Malibu, Calif. 90265.

CAD/CAM, CAE Executive Workshops '87. Cambridge, Mass., March 9-10 — Contact: Cynthia Wolfram, Daratech, Inc., 16 Myrtle Ave., Cambridge, Mass. 02138.

Electronic Banking: The Challenges of Tomorrow's Bank Within Yesterday's Legal Framework. Brussels, March 9-10 — Contact: Alan Galaski, Conference Office Brussels, 19 rue de l'Orme, B-1040 Brussels.

11th Annual BRS User Meeting. Kansas City, Mo., March 9-10 — Contact: BRS Information Technologies, 1200 Route 7, Latham, N.Y. 12110.

Computer Technology and the Law: Protecting Your Rights. Arlington, Va., March 9-11 — Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

Federal Office Systems Expo. Washington, D.C., March 9-12 — Contact: National Trade Productions, Inc., Suite 400, 2111 Eisenhower Ave., Alexandria, Va. 22314.

Effective Management Skills for the MIS Manager. Cambridge, Mass., March 9-12 — Contact: American Management Association, 135 West 50th St., New York, N.Y. 10020.

Open Network Architecture: Computer III Status Report. Arlington, Va., March 10-11 — Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

Corpcon East. New York, March 10-12 — Contact: Linda Morris, Corpcon, P.O. Box 3727, Santa Monica, Calif. 90403.

Software Performance Engineering. Denver, March 10-13 — Contact: Performance Engineering Services, Dept. 120, P.O. Box 9802, Austin, Texas 78766. Also being held June 2-5 in Washington, D.C.

Optical Information Systems. Long Beach, Calif., March 11-13 — Contact: Meckler Publishing, 11 Ferry Lane W., Westport, Conn. 06880.

MARCH 15-21

The 1987 National Automated Clearing House Association Conference. San Diego, March 15-18 — Contact: NACHA, Suite 640, 1901 L St. N.W., Washington, D.C. 20036.

Fifth Annual Computer Based Training Conference and Exposition. Atlanta, March 15-18 — Contact: Julia Stasio, Conference Registrar, Weingarten Publications, Inc., 38 Chauncy St., Boston, Mass. 02111.

Guide International. Anaheim, Calif., March 15-20 — Contact: Guide Headquarters, 111 E. Wacker Drive, Chicago, Ill. 60601.

Software Quality Assurance. Los Angeles, March 16-17 — Contact: U.S. Professional Development Institute, Suite 221, 1734 Elton Road, Silver Spring, Md. 20903.

1987 West Coast Manufacturing, Accounting and Production Information Control System Users Conference. San Diego, March 16-17 — Contact: Salem Corp., 1654 Poplar Lane, Annapolis, Md. 21401.

Artificial Intelligence and Expert Systems. Cleveland, March 16-17 — Contact: Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138. Also being held in Louisville, Ky., Dayton, Ohio, Portland, Ore., Fort Worth, Texas, Baltimore, Richmond, Va., Concord, Calif., and Tulsa, Okla.

Fifth National Conference on Measuring Data Processing Quality and Productivity. Orlando, Fla., March 16-18 — Contact: Quality Assurance Institute, 9222 Bay Point Drive, Orlando, Fla. 32819.

Electronic Data Processing Audit Managers' Roundup III. Orlando, Fla., March 16-19 — Contact: MIS Training Institute, 4 Brewster Road, Framingham, Mass. 01701.

TCP/IP Interoperability Conference. Monterey, Calif., March 16-19 — Contact: Advanced Computing Environments, 21370 Vai Ave., Cupertino, Calif. 95014.

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Tutorial Week. Kissimmee, Fla., March 16-20 — Contact: Computer Society of IEEE, 1730 Massachusetts Ave. N.W., Washington, D.C. 20036.

Open Systems Interconnection. Washington, D.C., March 16-20 — Contact: The Omnicom Institute, Omnicom, Inc., 501 Church St. NE, Vienna, Va. 22180. Also being held April 27-May 1 in Minneapolis.

Workshop on Factory Communications. Gaithersburg, Md., March 17-18 — Contact: Robert Rosenthal, B217 Technology Building, National Bureau of Standards, Gaithersburg, Md. 20899.

The Fifth Technology Opportunity Conference on Optical Storage of Documents and Images. Washington, D.C., March 17-19 — Contact: Rothchild Consultants, 256 Laguna Honda Blvd., San Francisco, Calif. 94116.

The National Association of Bank Servicers Semiannual Meeting. Tampa, Fla., March 17-20 — Contact: National Association of Bank Servicers, Suite B, 5008 Pine Creek Drive, Westerville, Ohio 43081.

The International Phoenix User Group Meeting. Atlanta, March 18-19 — Contact: Livingston and Associates, P.O. Box 30619, Cleveland, Ohio 44130.

Testing Computer Software. Los Angeles, March 18-20 — Contact: U.S. Professional Development Institute, Suite 221, 1734 Elton Road, Silver Spring, Md. 20903.

1987 Template User Network (TUN) Annual Conference. Arlington, Va., March 18-20 — Contact: Template, 9645 Scranton Road, San Diego, Calif. 92121.

Innovative Systems 1987 User Group Conference. San Francisco, March 18-20 — Contact: Innovative Systems, Inc., 341 Fourth Ave., Pittsburgh, Pa. 15222.

MARCH 22-28

Electronic Computing Health Oriented (ECHO). Hot Springs, Va., March 22-25 — Contact: Electronic Computing Health Oriented, 10401 Fernwood Road, Bethesda, Md. 20034.

National Computer Graphics Association's Computer Graphics '87: Applications for Excellence. Philadelphia, March 22-26 — Contact: National Computer Graphics Association, Suite 200, 2722 Merrilee Drive, Fairfax, Va. 22031.

Managing the Information Resource. Los Angeles, March 22-27 — Contact: Nolan, Norton & Co., One Cranberry Hill, Lexington, Mass. 02173.

Sixth Annual International Spectrum U.S.A. '87. Las Vegas, March 23-25 — Contact: International Data Base Management Association, Suite 104, 9740 Appaloosa Road, San Diego, Calif. 92131.

National Capacity Planning Conference. Washington, D.C., March 23-26 — Contact: National Capacity Plannin Conference, 3825-I South George Mason Drive, Falls Church, Va. 22041.

Walker Inter/Actions Users Conference. Denver, March 23-26 — Contact: Walker Interactive Products, 100 Spear St., San Francisco, Calif. 94105.

Seventeenth Conference on Computer Audit, Control and Security. Boston, March 23-27 — Contact: EDP Auditors Foundation, Inc., P.O. Box 88180, Carol Stream, Ill. 60188.

Datacon '87. St. Louis, March 24-25 — Contact: Datacon, P.O. Box 1401, St. Louis, Mo. 63188.

I/O Interface '87. Gaithersburg, Md., March 24-25 — Contact: William E. Burr, National Bureau of Standards, A216 Technology Building, Gaithersburg, Md. 20899.

Third International Conference on Computerization of Medical Records. Chicago, March 24-27 — Contact: Registrar, Institute for Medical Record Economics, 121 Mt. Vernon St., Boston, Mass. 02108.

1987 SIM Institutional Member Conference. Miami, March 25-27 — Contact: Society for Information Management, Suite 600, 111 E. Wacker Drive, Chicago, Ill. 60601.

Electronic Data Interchange. Arlington, Va., Feb. 19-20 — Contact: TDCC, Suite 712, 1101 17th St. N.W., Washington, D.C. 20036. Also being held March 26-27 in Washington, D.C.

12th West Coast Computer Faire. San Francisco, March 26-29 — Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

MARCH 29-APRIL 4

The Inevitable Partnership. Atlanta, March 29-April 1 — Contact: Life Office Management Association, 5770 Powers Ferry Road, Atlanta, Ga. 30327.

EFTA Expo. Las Vegas, March 29-April 1 — Contact: Electronic Funds Transfer Association, Suite 1000, 1726 M St. N.W., Washington, D.C. 20036.

Management Information Systems for Strategic Advantage. Philadelphia, March 29-April 3 — Contact: Office of Executive Education, The Wharton School, 200 Vance Hall, University of Pennsylvania, Philadelphia, Pa. 19104.

Applying the Records Management Technologies. New York, March 30-April 1 — Contact: American Management Association, P.O. Box 319, Saranac Lake, N.Y. 12983. Also being held April 13-15 in Chicago.

Interface '87. Las Vegas. March 30-April 2 — Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

Reducing the Cost of Software. Washington, D.C., March 31-April 2 — Contact: Performance Engineering Services, P.O. Box 9802, Dept. 120, Austin, Texas 78766.

The 1987 National Conference on Data Processing Quality Assurance. Chicago, April 1-3 — Contact: Quality Assurance Institute, 9222 Bay Point Drive, Orlando, Fla. 32819.

1987 Computer Dealers & Lessors Association Spring Meeting. Orlando, Fla., April 1-4 — Contact: Computer Dealers & Lessors Association, 1212 Potomac St. N.W., Washington, D.C. 20007.

Networking: The Large Organization Perspective. Melbourne, Fla., April 2-3 — Contact: Harris Briefing Center, 1025 W. Nasa Blvd., Melbourne, Fla. 32919.

APRIL 5-11

CHI & GI '87. Toronto, April 5-9 — Contact: Human Factors in Computing Systems & Graphics Interface 1987 Conference Office, Computer Systems Research Institute, University of Toronto, 2002 - 10 Kings College Road, Toronto, Ontario M5S 1A4.

The 1987 Eastern Simulation Conferences. Orlando, Fla., April 6-9 — Contact: The Society For Computer Simulation. P.O. Box 17900, San Diego, Calif. 92117.

The 1987 Facsimile and Image Communications Conference. Boston, April 6-8 — Contact: Cap International, One Snow Road, Marshfield, Mass. 02050.

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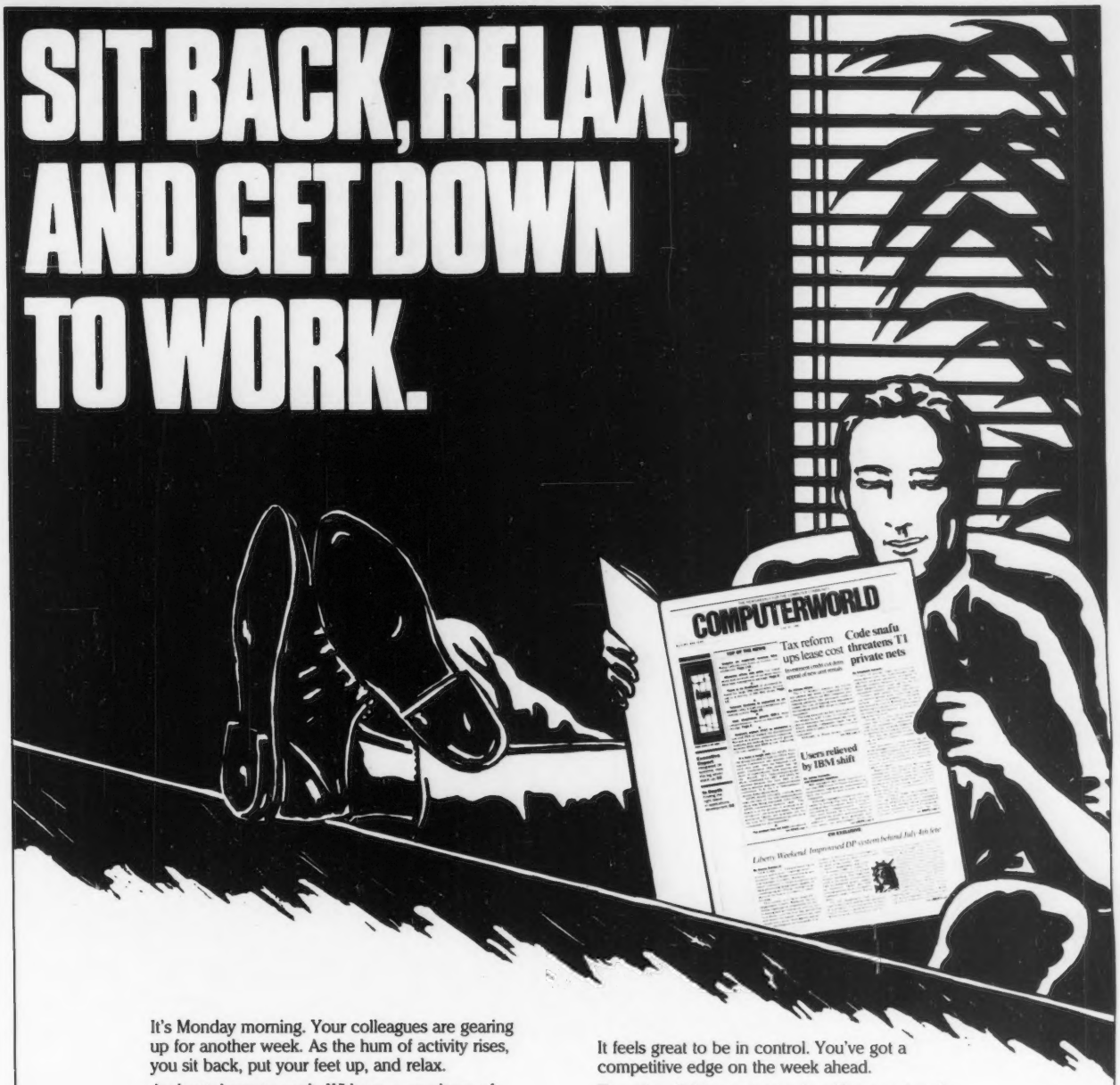

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COMPUTER INDUSTRY

INDUSTRY INSIGHT

Clinton Wilder

Sun peeks out

The computer industry recently staged its own version of the climactic final scene of *The Graduate* when Sun Microsystems, Inc. drove up the California coast to snatch Centram Systems West, Inc. away from the altar and its imminent marriage to 3Com Corp. But unlike the wistful Dustin Hoffman riding off with his bride in the back of a public bus, Sun Microsystems appears to have a solid future ahead.

In its five-year history, Sun has always seemed to be eclipsed by someone else's shadow. Apollo Computer, Inc. pioneered the engineering workstation market, with Sun joining in later. And Sun's highly successful initial public offering last year hardly received the financial community's attention or a cover spot on *Fortune* as did Microsoft Corp.'s stock sale.

But Sun should be coming out of the shadows very soon — and with good reason. Chief Executive Officer Scott McNealy said at a recent investment conference that the firm has hitched its wagon to three significant industry trends.

These movements are the rise of departmental computing, the move toward standards like Unix and Ethernet and the long-awaited momentum of Unix itself. The federal government's requirement that computer contract applicants must be able to run Unix has been well publicized, but many influential users — including Schlumberger Ltd. (a Sun OEM), General Motors Corp. and Ford Motor Co. — have adopted similar procurement requirements.

Many think of Sun primarily in the computer-aided design (CAD) arena, but in fact, CAD and computer-aided engineering applications accounted for just 24% of Sun's sales in the fiscal year ended June 1986. Computer-aided software engineering, a newer, faster growing and potentially more broad-based mar-

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Policy Management deals from strength with IBM marketing pact

BY ALAN ALPER
CW STAFF

Since IBM became the exclusive U.S. distributor of banking software from Hogan Systems, Inc. in Dallas last year, analysts have looked for Big Blue to sign similar agreements with software developers that have successfully penetrated other strategically important vertical markets.

So when Policy Management Systems Corp., a developer of applications software for the insurance industry, recently disclosed that it had inked a cooperative marketing agreement with IBM under Big Blue's Industry

G. Larry Wilson

Marketing Assistance Program (IMAP), some analysts were quick to draw parallels to the Hogan Systems deal.

Both Hogan and Policy Management are leading applications software suppliers to their respective industries, and both serve markets that are of vital significance to IBM. Banks and insurance companies are among the largest users of IBM equipment. Of Policy Management's approximately 500 customers in the property and casualty insurance industry, "only one or two have even looked at DEC equipment," says G. Larry Wilson, Policy Management president and chairman.

"The IBM alliance gives an

Continued on page 96

EDS says case closed in Britain

BY JOHN LAMB
SPECIAL TO CW

LONDON — Electronic Data Systems Corp. (EDS) claims it has reached an agreement with British immigration authorities following investigations into allegations that EDS tried to skirt UK immigration laws.

The controversy had clouded EDS's bid to design and run a government data communications network worth an estimated 400 million pounds, or $609 million.

In 1985, a memo sent by an EDS manager to U.S. employees instructed them not to reveal, as required by immigration laws, that they were going to the UK to work. After discovering this, members of the British Parliament's opposition Labor party

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Inside

Unisys plans relocation; layoffs likely

BY JEAN S. BOZMAN
CW STAFF

DETROIT — Unisys Corp. ended 1986 by trimming its financial sails — selling major business units to offset the $4.3 billion cost of merging Burroughs Corp. and Sperry Corp. This year, with an emphasis on consolidation, Unisys is moving all in-house semiconductor operations to a single site in Rancho Bernardo, Calif., where the A 15 semiconductor components are made.

The move, announced recently, is expected to be complete by December. It may result in the dismissal of 800 of the 900 Unisys employees who worked at two Sperry semiconductor plants in Minnesota. It will also mean that further development of the Unisys 1100 mainframe's chips will have to take place at Rancho Bernardo. The plant is described as a state-of-the-art facility, where Burroughs and Motorola, Inc. participated in joint development related to the Burroughs A series.

"The decision to phase out the Minnesota operations was

Continued on page 96

MSA still high on mainframe sales potential

But Imlay broadens firm's base with vertical-market buying spree

BY JAMES A. MARTIN
CW STAFF

ATLANTA — Despite the apparent slowdown in mainframe sales in favor of high-end minicomputers and supermicros, Management Science America, Inc. (MSA) is confident that IBM mainframe applications software is leading the industry out of its two-year slump.

"Users are no longer focusing on hardware," declares John P. Imlay Jr., MSA chairman and chief executive officer. "They are now focusing on solving their business problems by developing a long-range information plan that complements their company strategies. As applications become implemented, machines are filled."

While not all would agree with that assessment, no one would disagree that MSA has weathered the recent slump well. The Atlanta-based company recently reported a 171% rise in 1986 net income, along with a 28% jump in revenue. Although MSA's 1985 net income was a modest $6.8 million, the company continued to report a profit through the last two turbulent years, while many other technology companies were not so lucky.

MSA plans to continue expanding in 1987 much as it did in 1986: by acquiring smaller companies with a strong presence in desired vertical markets and increasing overseas marketing and sales efforts. MSA will also emphasize adapting its mainframe application packages to market and technology changes through a combination of internally financed research and development and joint ventures.

Like other mainframe software vendors such as Computer Associates International, Inc., Uccel Corp. and Pansophic Systems, Inc., MSA went on a buying binge in 1986. First, MSA ventured into the IBM System/36 and System/38 minicomputer arena by acquiring RTS Ltd., a Dublin, Ireland-based manufacturing and financial software vendor.

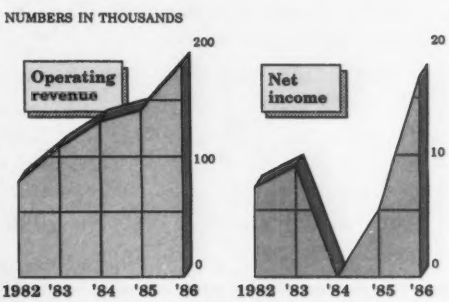
One month later, the company announced it would acquire Information Associates, Inc., with software offerings for IBM mainframe and Digital Equipment Corp. VAX minicomputers in the higher education market.

MSA saved its largest acquisition for last with Comserv, a manufacturing resource planning software vendor with pack-

Continued on page 89

MSA's 1986 rebound

Revenue and income for the last five years



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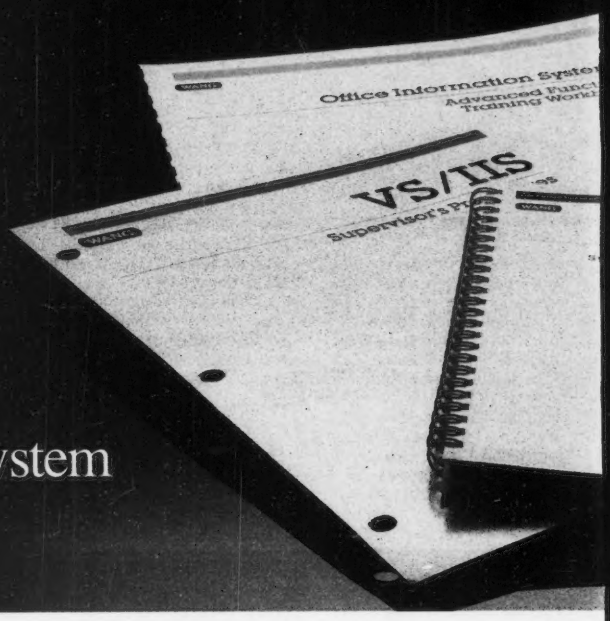

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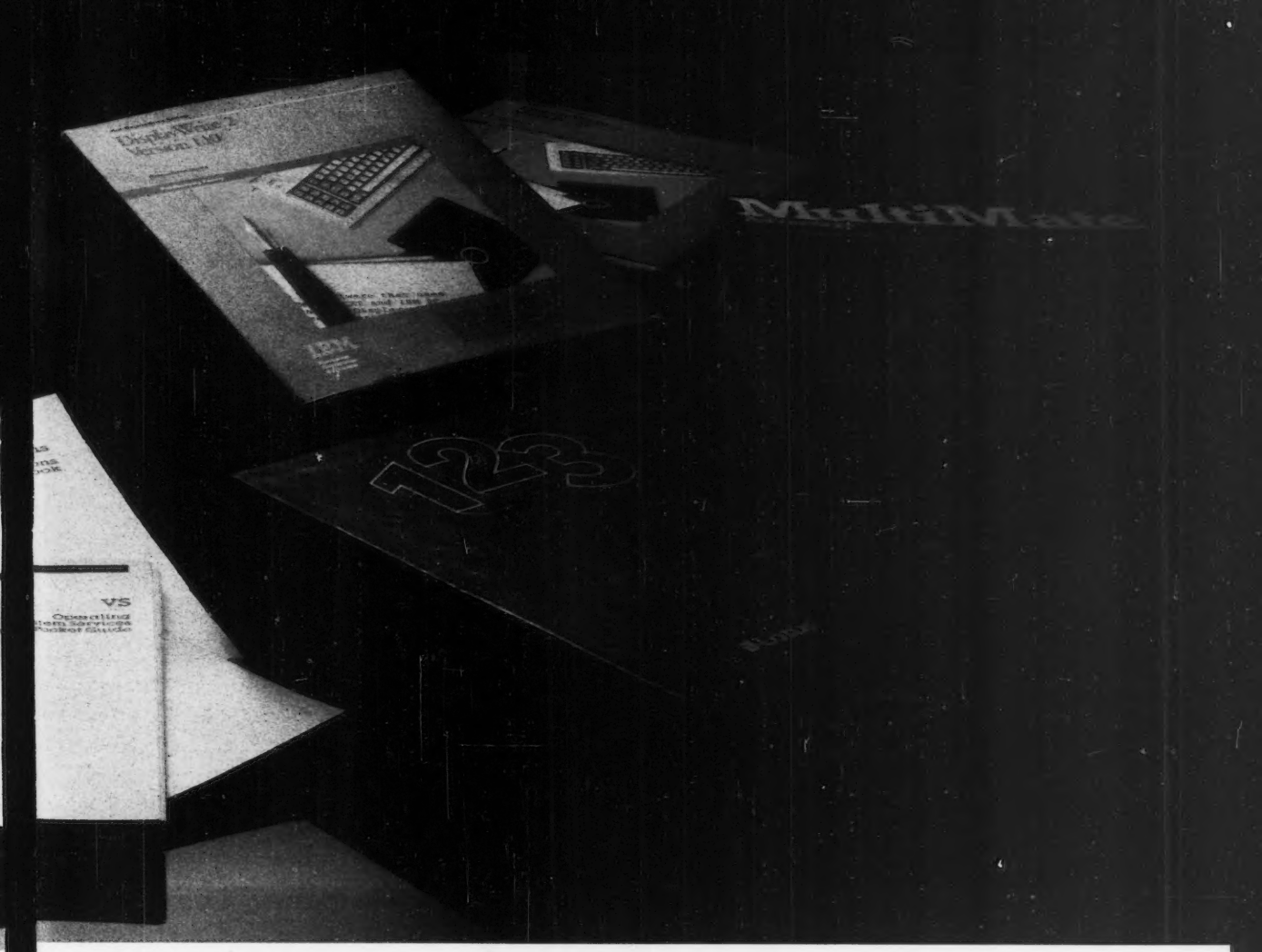

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ACTIVE ISSUES

Kathy Porteus

Terminal makers step up stock

As the stock market maintains its quick tempo, selected segments of technology have not missed a beat. One such area has been computer terminal stocks. But analysts attribute much of the stock move for this group to diversification efforts by firms such as Wyse Technology, Inc. (WYSE — 24¾) and Telex Corp. (TC — 87⅜) rather than improvement in terminal-market conditions.

Sluggish demand for mainframes and supermicrocomputers has hurt both IBM 3270-compatible and ASCII terminal businesses, according to Kenneth Leung of Smith Barney, Harris Upham & Co. Nevertheless, terminal companies are attempting to circumvent such flat growth by offering fuller product lines. The leading stock performers correspond with the companies that have most successfully diversified their traditional terminal business, namely Telex and Wyse.

Telex has scored with investors, Leung contends, because of its IBM 525X-compatible minicomputer terminal products and strong gains overseas with its 3270 systems. Leung says these factors assure Telex's growth for the next 15 months even without a resurgence in domestic demand for mainframes, and hence, 3270 terminals.

For these reasons, Leung continues to recommend the purchase of Telex, which he estimates will earn $5.30 per share in fiscal 1987, ending March 31, and $7.05 per share next year.

Similarly, Wyse has become a favorite among securities analysts because of its smooth shift into systems and display monitors. Joel Houseman, an analyst with Robertson, Colman & Stephens, says nonterminal business accounts for 50% of Wyse's revenue and most of the company's growth. Despite adverse industry conditions, "Wyse has continued to deliver the numbers," Houseman adds, "and the outlook continues to be good." He estimates the company will earn $1.50 for fiscal 1987, ending March 31, and $1.95 per fully diluted share in fiscal 1988.

Walter Winnitzki of L. F. Rothschild, Unterberg Towbin agrees that a major reason investors have become interested in Wyse is its participation in the microcomputer industry, which late last year attracted renewed enthusiasm from Wall Street. Yet Winnitzki maintains that Wyse's accelerated order and revenue momentum reflects strength in all areas of the company's business, including ASCII terminals.

Winnitzki estimates Wyse will earn $1.52 per share for the fiscal year ending March 31 and $2 per share next year. His 1988 estimates assume flat margins and revenue growth of 25% to 30%. However, he suspects his estimates might prove conservative, considering the company's recent quarterly growth of 57%. Both Winnitzki and Houseman of Robertson, Colman aggressively recommend Wyse. Winnitzki says Wyse still sells at a 30% discount to the Standard & Poor's 400, even after its recent 50% jump in price per share.

Behind Wyse, the big name in publicly traded ASCII terminal suppliers is Televideo Systems, Inc. (TELV — 2⅝). Yet Televideo's stock has stayed below $4, largely because of lost momentum in the terminal marketplace and unstable management. "Televideo's terminal products are now much more competitive, and the company continues to ship more units," Houseman says, "but this still represents a highly speculative situation."

Lee Data Corp. (LEDA — 8¼) is another stock with a troubled history, but it has recently benefited from Wall Street's notice of low-end hardware manufacturers. Lee Data's traditional business is IBM 3270-compatible terminals, but it has diversified.

Houseman says Lee Data's momentum should begin coming through in earnings. Houseman estimates Lee Data will earn 44 cents and 65 cents per share in fiscal 1987, ending March 31, and 1988, respectively.

Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized research services for financial and high-tech firms.

Three Wang VPs quit; more may go

BY STANLEY GIBSON
CW STAFF

LOWELL, Mass. — Three Wang Laboratories, Inc. vice-presidents have departed recently, fueling speculation that the moves were in response to the new regime of Frederick Wang, the son of the company's founder and longtime chairman and chief executive officer, An Wang. Frederick Wang became president and CEO last fall.

Samuel Gagliano, vice-president of the strategic marketing program, resigned effective Feb. 6. Two weeks before, Richard Connaughton, vice-president of voice product marketing, resigned. Connaughton was in charge of Wang operations relating to its Intecom, Inc. subsidiary and Telenova, Inc., in which Wang owns a 42% interest.

Intecom, the Richardson, Texas maker of digital private branch exchange equipment, has been plagued by losses and may have been responsible for one third of Wang's $30 million loss in the second quarter of fiscal 1987.

Ralph Crusius, vice-president and assistant to Chairman An Wang, retired Jan. 30. "There are more changes coming as regions are combined. Some [more] vice-presidents will go," said John McCarthy, an industry analyst with Forrester Research, Inc. in Cambridge, Mass.

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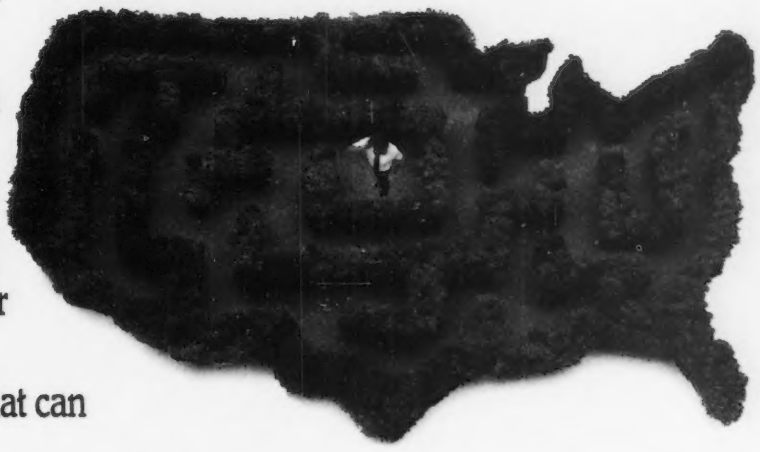

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CONFERENCE NOTEBOOK

Executives stress multivendor connectivity

BY ALAN ALPER
and CLINTON WILDER
CW STAFF

NEW YORK — The era of dispersed computing has arrived. That was the message delivered by executives of several leading computer and communications firms to investors at a recent Goldman, Sachs & Co. high-technology conference.

The paramount theme, according to the executives, is multivendor connectivity, whether within local-area networks (LAN), between minicomputers functioning as departmental processors or via gateways to IBM mainframes.

Computer users, within work groups or between departments, need to be able to exchange information in a timely and cost-effective manner, the executives said.

Among the vendors making presentations were:

3Com Corp. In outlining the Mountain View, Calif., firm's plans, President William Krause stressed that 3Com is not just a LAN vendor but also a supplier of work-group computing products.

In that vein, Krause said, the firm is investigating the development of an office network-station, a high-performance microcomputer that would use application-specific integrated circuits to provide built-in networking capability, integral enhanced graphics adapter cards and high-resolution monitors.

> "JUST as we learned in PCs . . . workstations are not isolated islands of office automation."
>
> WILLIAM KRAUSE
> 3COM CORP.

Such a system would be akin to engineering workstations offered by Apollo Computer, Inc. and Sun Microsystems, Inc. and would replace and/or co-exist with networked microcomputers.

Krause declined to say when 3Com would introduce an office network-station, or whether it would be produced internally or purchased from another vendor.

The need for such a product, he said, is obvious within work groups that make up the base level of many firms' three-tiered information structures. "Just as we learned in PCs, microcomputers are not stand-alone islands of office automation," he said, "so, too, workstations are not isolated islands of office automation."

Krause pointed out that there is still much opportunity within the existing base of personal computer users. Despite all the talk of LANs, 77% of all PCs still operate in a stand-alone fashion, he said.

Ungermann-Bass, Inc. In line with its goal to be "an information exchange company," Chief Executive Officer Ralph Ungermann said the Santa Clara, Calif., firm has begun to unbundle its software.

The Universal workstation product provides users with access to a multiplicity of computing environments including IBM 370 and Digital Equipment Corp. VAX as well as Microsoft Corp. MS-DOS microcomputers.

The goal is to facilitate universal file transfer between disparate systems, he said. "A hot key enables users to switch between the different computing worlds," Ungermann explained.

Ungermann foresees incremental revenue growth during the current quarter as a direct result of software unbundling, which began only a few weeks ago. "We should know more as the year goes on," he said.

National Semiconductor Corp. President Charles Sporck said the near-term prospects for a semiconductor industry recovery are still hampered by oversupply. "I don't believe we will see much relaxation of pricing pressure for some time," he said. "There is still too much overcapacity." He added that the overstocked inventory problem is more acute for the distributor channel than system OEMs.

Although Sporck said the U.S.-Japan semiconductor trade pact means little if the Japanese continue to dump products in third-country markets, he predicted the agreement will eventually benefit U.S. vendors. "It's going to work because it's in the best interests of Japan to make it work," he said. "The U.S. is serious about this issue, and the Japanese have much more to lose in a trade war than we do."

Sporck predicted IBM's recently announced 3090 Model 600E will actually help sales of National Advanced Systems' comparable AS/XL 100 because customers have delayed their purchases in anticipation of IBM's move. "It will spur the buying cycle again," he said.

Amdahl Corp. Chief Operating Officer Joseph Zemke called the 5890 CPU, announced last year, "the best product launch we've ever had." He said that within the past two months, Amdahl has signed four volume purchase agreements, ranging from five to 20 processors. He also noted that the Sunnyvale, Calif., firm sold three systems in 1986 to formerly all-IBM shops.

MSA sales

CONTINUED FROM PAGE 81

ages running on Hewlett-Packard Co.'s 3000 minicomputer. Comserv has been merged into a new MSA division, Advanced Manufacturing.

"MSA moved too slowly for too long," says Curt Monash, technology analyst with Paine Webber, Inc. "These acquisitions largely compensate for that. They now have two strong vertical markets — manufacturing and education. But they need to be stronger on the DEC VAX and in financial services applications."

MSA faced eroding market share several years ago, says Chris Mortenson, software analyst for Alex Brown & Sons, Inc.'s New York office, but "they've more than solved that problem now." Even as mainframes drop in popularity in favor of minicomputers, MSA is in a strong position, since most manufacturers, accounting for 42% of MSA customers, continue to use mainframes, Mortenson says.

MSA's Imlay

MSA will be developing or acquiring vertical-market applications in retailing, banking and insurance, according to Imlay. "We have a wish list, and we have a lot of cash," he says, adding that the company currently has some $85 million in the bank.

MSA is also strongly interested in DEC's VAX minicomputer and IBM's recently announced 9370. "We've moved into the System/36 and 38 market with RTS, and with the VAX coming on strong, you'll certainly see us in that marketplace as well," Imlay says.

In addition to future acquisitions, MSA is planning several joint ventures. The first is an agreement with Aion Corp. of Palo Alto, Calif., in which MSA will incorporate Aion's artificial intelligence technology into several of its own mainframe applications and will jointly market Aion expert systems software, according to Dennis Vohs, president of MSA Advanced Manufacturing.

In the future, every application package will have AI elements, Vohs says. "Software companies not doing anything in that area are going to have real problems in a few years," he maintains. MSA is positioned for adding AI capabilities as a result of the expert systems features of its Information Expert technology, he adds.

The company is currently negotiating joint ventures with several hardware vendors for manufacturing applications, Vohs says.

"We have some 3,200 manufacturing customers out of only 5,000 manufacturers that have mainframes, but there are hundreds of equipment suppliers. We're setting up some programs so those vendors looking for a large installed base can integrate with our software," he says.

IBM's DB2 relational data base and SQL have become mainframe standards, and MSA has been working to integrate its applications with them, according to Vohs. Beta tests of MSA's General Ledger and Information Expert systems under DB2 and SQL began in November, and development will be continuing this year.

Sun peeks

CONTINUED FROM PAGE 81

ket, accounted for 38%.

Sun appears to be serious about the markets of MIS applications development and office automation. It entered a joint marketing agreement with Wang Laboratories, Inc. — as did Apollo — late last year, and McNealy is proudly trumpeting Sun's 15 new customers in the Wall Street financial community. He also says Sun is about to "unhook a customer's $5 million mainframe order" by supplanting the box with a dozen of its 4 million instructions per second, high-end servers.

Forty percent of Sun's business is through OEMs, mainly traditional factory automation vendors like Computervision Corp. and Gould, Inc. But Sun claims that no one customer accounts for more than 10% of its sales, heeding a lesson learned the hard way by so many OEM suppliers.

In many ways, Sun is a throwback to the days when a Silicon Valley hardware company founded by a few whiz kids — McNealy is just 32 — could come along and dazzle the industry.

Sun is indeed growing fast — maybe too fast. In its most recent quarter, the opening of a new production plant fueled a 173% gain in sales to $115.3 million, while profits soared 405% to $8.5 million. Partly in an effort to staff the new plant, Sun is hiring new employees at the unheard-of rate of 200 to 250 a month. Talk about ramping up.

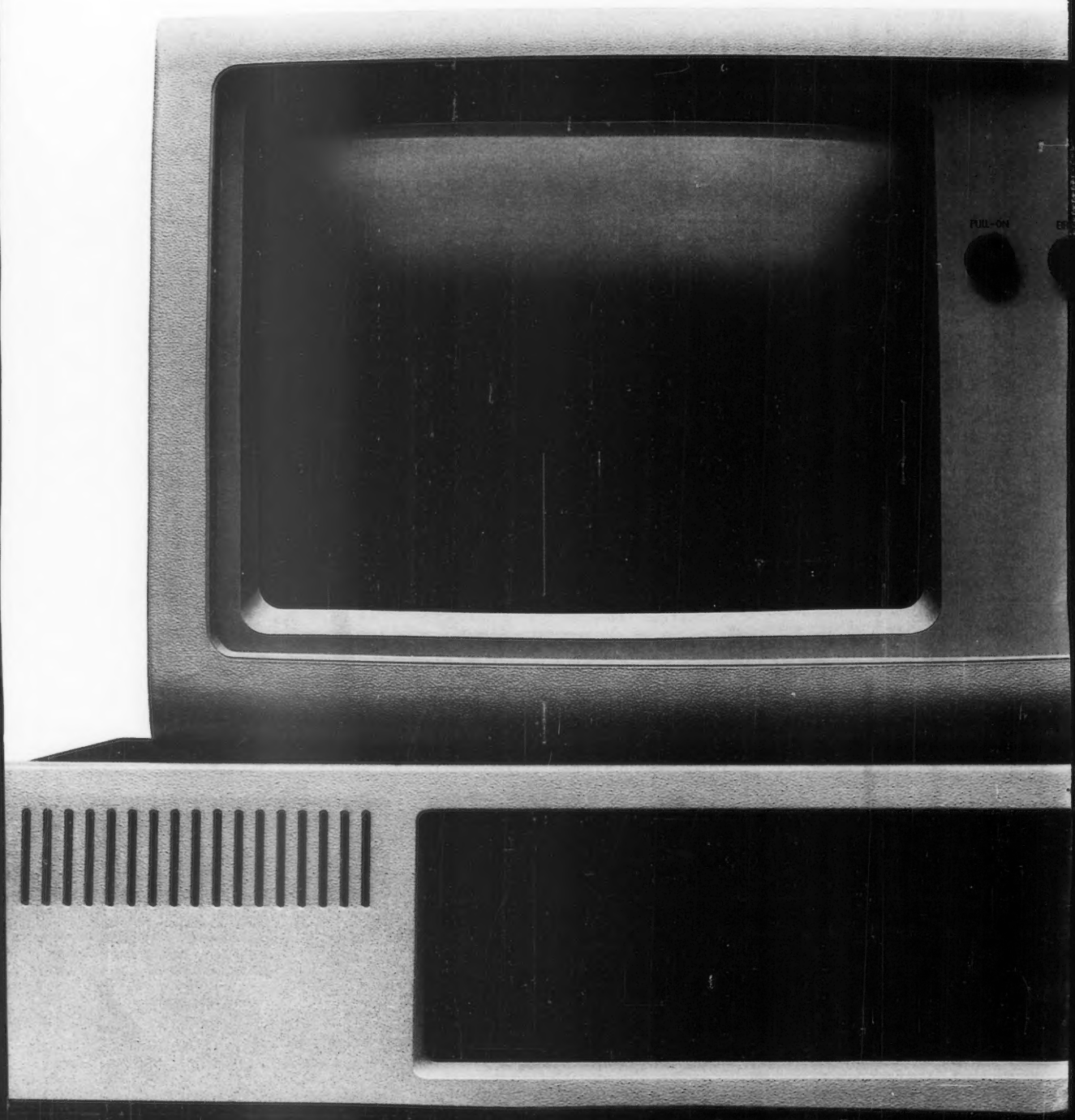
Despite such heady growth, Sun appears realistic about the increased competition it will face from vendors such as Hewlett-Packard Co., Digitial Equipment Corp., Apple Computer, Inc. and IBM.

Apple's upcoming Open Macintosh has been dubbed the "Sun Killer," and McNealy freely admits that the new Mac will eat into Sun's computer-aided publishing market share. But that market was only 16% of Sun's business in the last fiscal year.

Clearly, all the big boys would like to gain some ground in the workstation arena. But as that market continues to heat up, it appears Sun will shine even hotter.

Wilder is *Computerworld's* senior editor, computer industry.

Underachiever.



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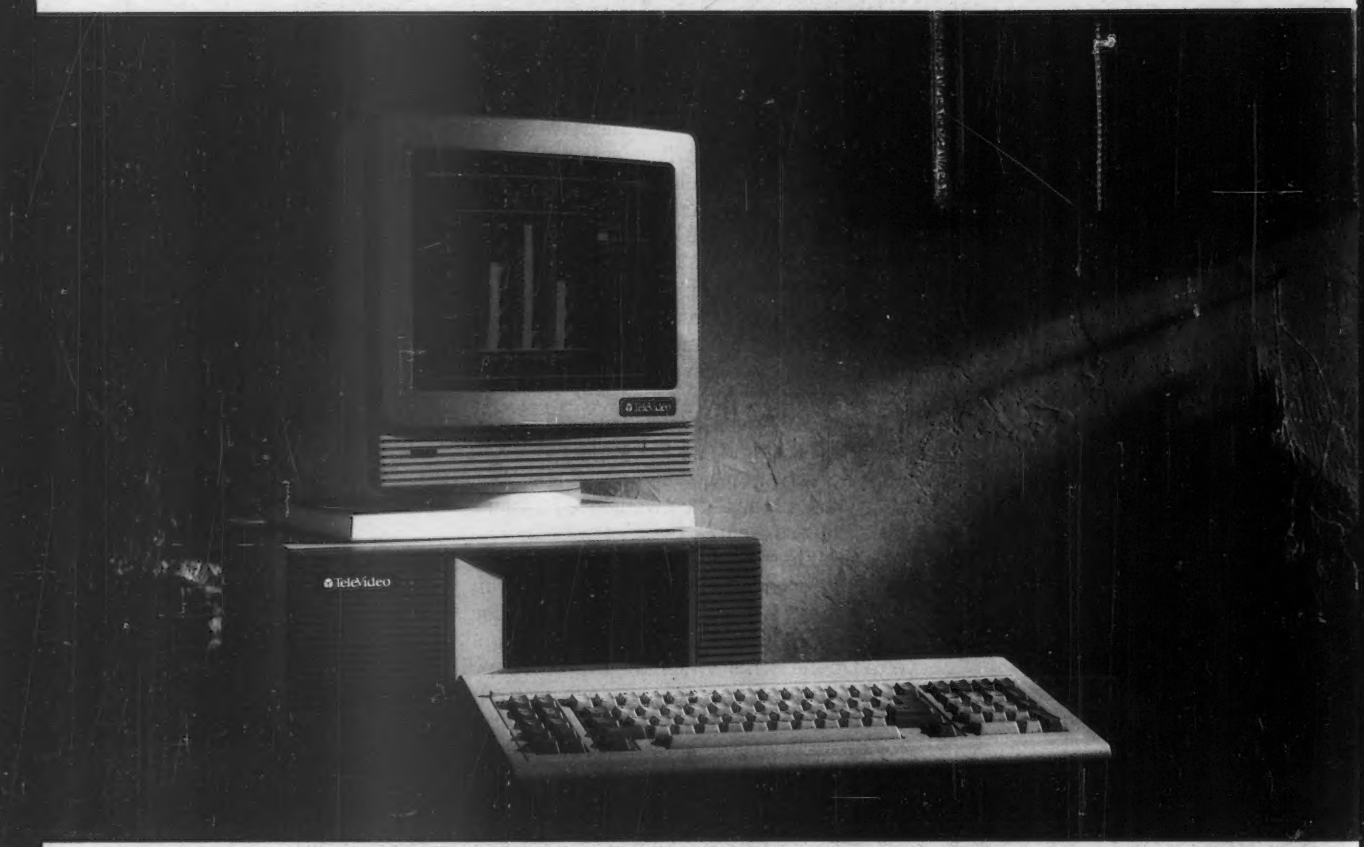

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Case closed

FROM PAGE 81

called unsuccessfully for government ministers to reveal whether prosecution was likely.

Last week, EDS announced that the company had accepted recommendations made by the UK's Home Office — the department responsible for immigration affairs — and that the matter was closed.

"It was not a general EDS document," a company spokesman said. "It was put out by a single manager."

The revelation of the employee memo came just as government computer departments began initial stages of awarding a 10-year contract to integrate communications between four government departments and run a network supporting 85,000 terminals.

The Government Data Network, as the project is called, is the UK equivalent of the $4.5 billion U.S. Federal Telecommunications System 2000 project, for which EDS is also competing. EDS, in partnership with Northern Telecom, Inc., is on a list of five consortia bidding for the Government Data Network. A list of final bidders will be announced later this month. Work on the network is expected to begin in September.

Despite promised expansion in the UK, EDS has so far failed to buy its way into the UK software business after an abortive bid for London-based Logica, Inc. in 1985. EDS reported European revenue of approximately $250 million in 1986, with $100 million from the UK.

The firm has been trying to increase its European activities. Late last year, EDS successfully acquired SPI, the software and services arm of France's metals giant Pechiney S.A.

Lamb is a London-based correspondent for the CW Communications International News Service.

EDS boasts strong profits for quarter

BY ALAN ALPER
CW STAFF

DALLAS — Strong growth in its non-General Motors Corp. business helped Electronic Data Systems Corp. (EDS) register a 25% increase in fourth-quarter profits of $71.5 million, or 58 cents a share.

Revenue for the period ended Dec. 31 was $1.15 billion, up 7% from the previous year's level. The strong quarter contributed to a year-end profit of $260.9 million, or $2.13 a share, up 37% from 1985. Revenue for the year jumped 27% to $4.37 billion.

Analysts said EDS's strong fourth-quarter performance primarily resulted from growth in non-GM business, putting to rest concerns that the data processing and services firm had lost its competitive edge. Non-GM business was up approximately 25% in the fourth quarter from the corresponding period last year, while captive business grew only 1%.

Getting closer to AT&T

EDS benefited from a host of federal, state and local government contracts, as well as agreements signed with health care and insurance firms throughout 1986, the Dallas firm said. The firm also expanded its relationship with AT&T and signed contracts with a number of international communications concerns during the year, the firm added.

Major deals inked in 1986 included an eight-year U.S. Air Force contract, an eight-year contract to automate the office of the U.S. Secretary of Defense, a five-year agreement with Isuzu Motors Ltd. in Japan and a contract with Midland Bank PLC in the UK.

EDS is in the second year of updating and integrating all of GM's data processing systems and is developing manufacturing simulation systems for the auto maker. The firm is streamlining GM's benefits systems, consolidating its 50 data processing centers into an integrated network of 14 larger facilities and creating a single global communications network.

It's Monday morning. Your

8:30 A.M. • TOKYO, JAPAN

IDG's International Data Corporation managing director **Yugi Ogino** is stopped in his tracks by a flash report on the company's International News Service. *Digital News* has just spotted a potential challenge to IBM's grip on the professional PC market: DEC has announced their Local Area VAX Cluster. Ogino sets up a conference call with *Computerworld Japan* editors to brief them on his analysis.

8:40 A.M. • SYDNEY, AUSTRALIA

At almost the same moment 4,300 miles to the south. *Computerworld Australia* publisher **Susan Coleman** sees the DEC story on her news wire. She calls in **Peter Scott**, her editor, to plan editorial coverage for their market.

11:00 A.M. • HELSINKI, FINLAND

Halfway around the world, **Timo Tolsa**, editor of IDG's Finnish computer newspaper *Tietoviikko Ky*, faxes his comments on the pending story to **Dieter Echbauer**, editor of *Computerwoche* in Germany, who appoints an editorial team to file a comprehensive story for use by all five IDG publications in Germany.

10:10 A.M. • BUENOS AIRES, ARGENTINA

Ruben Argento, the head of IDG's *Computerworld* newspaper in Argentina uncovers a new wrinkle in the rapidly unfolding story—and alerts Doane Perry, senior market consultant at IDC in Framingham, Massachusetts: a DEC competitor in South America is developing a similar cluster product.

world just changed again.

10:30 A.M. • BOSTON, MASSACHUSETTS

IDG reporter **Kathryn Esplin** files a VAX Cluster story for *Digital News*. Her back-up analysis is sent to all publication offices around the world on the company's news wire.

2:00 P.M. • FRAMINGHAM, MASSAC TTS

Perry meets with **Bill Ford**, IDC Information Industry Services Chief, to plan a global research report on computer clusters and their potential impact on business users.

4:45 P.M. • PALO ALTO, CALIFORNIA

IDC Research Director **Jean Yates** faxes detailed schedules of the report requirements to IDC research centers in 16 other countries. Deadline: 1 week. Overnight mail announcements of the pending report are mailed to IDC's top 1,000 customers around the world.

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Policy

FROM PAGE 81

aura around something a company has developed," notes Chris Mortenson, an analyst with Alex Brown & Sons, Inc. in Baltimore. "It's as if IBM has blessed something."

On closer inspection, however, the OEM agreeement IBM signed with Hogan last spring [CW, May 12] has many more differences than similarities to its IMAP arrangement with Columbia, S.C.-based Policy Management.

For one, Policy Management is not limited to an exclusive working relationship with IBM under the IMAP agreement, and it retains marketing rights to its products. Hogan gave up domestic marketing rights to its products to IBM in return for royalty payments, which analysts have estimated at 40% to 50% on each sale.

Policy Management, on the other hand, gave up its IBM value-added reseller status for its role as an IMAP partner. The firm will receive commissions of less than 10% for each joint sale the two companies make on IBM hardware, according to Wilson.

Policy Management will also get an unspecified commission on strategic software components licensed with hardware, such as DB2, SQL and library-control facilities, notes Don Coggiola, Policy Management executive vice-president of field operations.

Another difference between the two situations is the financial wherewithal of the two software developers. Hogan had suffered through a string of well-publicized financial problems before giving IBM the right to market its software. Although Policy Management's profits dipped 5% last year, the firm still earned $13.8 million on revenue that grew 46% to $150.6 million.

Both situations also reflect IBM's move to strengthen its financial performance by increasing its emphasis on software. Analysts expect IBM to build additional alliances with other software firms this year, dubbed its "Year of the Customer."

'IBM has not moved fast'

"IBM has to derive a larger percentage of its revenue stream from software and services, and they have not moved fast in that regard," notes Rick Sherlund, an analyst who follows the software business for Goldman, Sachs & Co. in New York.

IBM's glaring lack of strong insurance industry applications software could be the reason it has aligned itself with Policy Management. "At worst, this is a deal struck between equals. You could argue that IBM needed Policy Management more than vice versa," Alex Brown's Mortenson maintains.

Although an IBM spokesman refused to comment on the agreement, Charles Buchheit, director of the insurance industry for IBM, told Policy Management's company newsletter, "When we identify an opportunity, the IBM marketing representative can bring Policy Management into the marketing situation. Policy Management may also identify an opportunity and initiate IBM's involvement."

While not bundling Policy Management software, the cooperative marketing arrangement should help IBM sell more 9370s to the insurance business, Sherlund says. "It will give them instant help in the mid-range," he suggests. "There, you need a joint sales effort."

By working with Policy Management, IBM should be able to better understand the needs of the insurance industry. In that vein, IBM is said to be restructuring its field sales force on an industry-specific basis to foster a closer relationship with its customers.

Unisys

FROM PAGE 81

the result of a comprehensive evaluation of its existing semiconductor capability in relation to future product requirements and desired business methodology," according to a company statement.

Approximately 100 of the workers will probably be relocated to Rancho Bernardo, according to Unisys, while the rest will be offered the outplacement services of a national relocation company. "This is part of our continuing effort to consolidate operations and to downsize the company," a corporate spokesman said.

Unisys is now saying it is a $9 billion corporation with 98,000 employees worldwide.

The Minnesota employees had staffed two former Sperry semiconductor facilities: a defense-related facility in Eagan, Minn., and a Unisys 1100 mainframe facility in Roseville, Minn.

Plant to remain in use

Unisys intends to find another use for the Eagan plant, which houses about 240,000 square feet of working space.

It is nearly as large as the 280,000-square-foot Rancho Bernardo facility, which is where very large-scale integration chips are made for the company's A series mainframes, including the A 15.

The move follows several other initiatives to consolidate operations from the Sperry and Burroughs sides of the company. Two other examples are the recent consolidation of all artificial intelligence development activities and all Unix software development projects.

Merger steps incomplete

"Effectively, we completed the major reorganizational moves by Jan. 1," the Unisys spokesman said. But he added that some areas, such as redeployment of the U.S. marketing force and cross-training of maintenance engineers, will take months to complete.

In order to promote a unified image of the company, press spokesmen from Burroughs and Sperry held their first extended meeting together last week in Blue Bell, Pa.

But that will not be the last word in reorganization. "The final step will be the complete changeover of all Sperry and Burroughs signs," the Unisys spokesman stated, "and that may take up to three years to complete."

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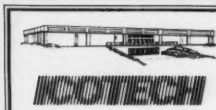

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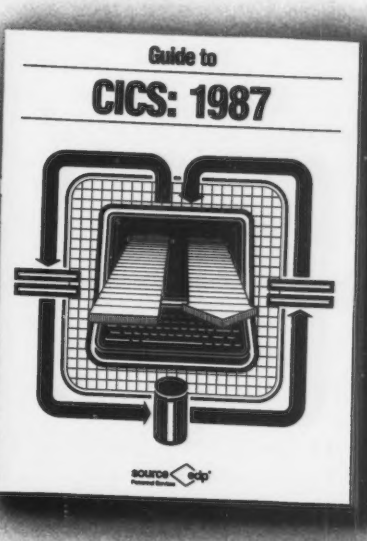

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Job requires Master's in Computer Science. Job also reqs: 1) Must speak and write Japanese and English languages; 2) 1 grad. course in management information systems; 3) 1 grad cse. in data base management; and 4) 1 grad cse. in systems programming. Job duties: Analyze, design, & construct systems to control production and inventory for Japanese owned steel mfg. concern. Gather information from user. Analyze info required. Document specification. Code job streams, test programs, and evaluate systems performance. Design software to Japanese parent company specs. COBOL computer language and IBM mainframe will be used to complete job duties. IBM programs will interface with DEC programs at a lower level. DEC computers will interface with machine sensing microcomputers installed and maintained by Japanese parent company. All computer info must be integrated into production process functions. Qualified applicants should send resume and verification of reqs to: 7310 Woodward Ave. Rm. 415, Detroit, MI 48202. Ref. #4687. Employer Pd. Ad.

ADABAS/NATURAL

Programmer, Systems Analyst, DBA, Systems Programmer

1 - years' experience with ADABAS and or NATURAL in various environments (VSE, MVS, VM). Key positions available nationwide. Call Mitchell Price (413) 586-9961 or send resume in confidence to:

HP *HANS PRICE ASSOCIATES*
P.O. Box 747
Northampton, MA 01061

Sr. Analyst/Programmer

We have an immediate opening in our medium sized manufacturing facility located in the Charlotte, North Carolina area. Qualifications must include minimum four years online COBOL programming, preferably on Data General AOS/VS MV Series computers. DBMS experience would be a definite plus. Please send resume including salary history in confidence to:

Jim Hadden, Personnel Administrator
Intercraft Industries Corporation
PO Box 1227
Statesville, NC 28677

EOE

DIRECTOR OF ACADEMIC COMPUTING

Manage Academic Computing, including VAX and H-P minis, supervise operation of resale facility, advise all users, direct staff, plan equipment replacement/upgrade for instruction/research, purchase materials, prepare/supervise budget, develop policies/strategic plans in consultation with advisory committee. Master's or equivalent exp. in computer science, information systems or related field. Min 3 yrs. managerial exp., preferably in university environment. A permanent professional staff position, salary/benefits commensurate with exp. and educ. Send resume and names of three references to: Mr. Larry D. Reeves, Personnel Dept., Loyola University, Box 16, New Orleans, LA 70118. Screening: March 15, 1987. Appointment: August 1, 1987. Affirmative Action/Equal Opportunity Employer.

EDP OPPORTUNITIES
SOUTHEAST U.S.

If you have 2 + yrs. exp. in Programming, Analysis, Technical Support, or Data Base on the following equipment, WE NEED TO TALK.

- IBM, OS/MVS/XA (Paul Reid)
- HP3000 (Lous Lemone)
- IBM System 38 (Rosemary Lemone)

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MIS OPPORTUNITIES

The MIS Department is currently expanding their operation, and currently seeks the following:

SR. PROGRAMMER ANALYST

- *3-6 years' programming experience in a manufacturing environment*
- *Experience in COBOL, DOS/VSE, VM/CMS, CICS, DL1, VSAM*
- *Expertise with IBM Mainframes*
- *Exposure to working with packages*
- *Relevant degree*
- *Knowledge of structured programming techniques*

SR. SYSTEMS PROGRAMMER

- *5 years' experience in systems programming or technical support*
- *Expertise in the following: BAL, COBOL, VM/SP, DOS, VSE, MVS/SP, DL/1, IMS, VSAM, CICS.*
- *Data Communications experience in the following areas: Software – ACF/VTAM, ACF/NCP Hardware – NCR, COMTEN 3650, IBM 3705/3725, modems, multiplexors, protocol converters*

In addition to competitive salaries, we offer excellent benefits, including relocation assistance. For immediate consideration, please send your resume and salary history, indicating position of interest, to: Ruth Lampe, Defense Communications Division, ITT Corporation, 492 River Road, Nutley, NJ 07110. An Equal Opportunity Employer. U.S. Citizenship Required.

ITT
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NEW DATA CENTER

Due to major international expansion we are opening a new state-of-the-art data center to support our U.S. operations linked to our international headquarters in Stuttgart. We have an ultra modern environment with a coastal location. Current staffing requirements are:

IMS/DB2 APPLICATIONS DEVELOPMENT

PROGRAMMER ANALYSTS
All Levels
PROJECT LEADERS
DATA BASE ANALYSTS
All Levels
DEPARTMENT MANAGERS
FOCUS APPLICATIONS All Levels
CICS APPLICATIONS All Levels

SYSTEMS PROGRAMMING

MVS XA SYSTEMS PROGRAMMERS
IMS SYSTEMS PROGRAMMERS
VTAM/NCP SYSTEMS PROGRAMMERS
VM/SP SYSTEMS PROGRAMMERS
TECHNICAL SUPPORT MANAGERS

Some positions may require European travel. Resumes only. No phone inquiries please.

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Data Processing

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Data Processing Professionals

If you are a Data Processing Professional interested in a career growth and challenging assignments in a state-of-the-art environment, Great Western Savings is looking for you. Our record-setting growth has created the need for the following people:

SYSTEMS ANALYST-REAL ESTATE SERVICING SYSTEMS

Will analyze Great Western's Automated Loan Servicing System and prepare detailed specifications for programmers while coordinating requests from Loan Operations Users. Successful candidates should possess strong oral and written communication skills and have a data processing background (programming experience is optional but desirable). Experience in the following areas required: Investor Reporting, Loan Accounting, Secondary Marketing and Loan Servicing.

SYSTEMS ANALYST-QUALITY ASSURANCE

Person will assist in coordination of software testing and migration and post-implementation review of new Integrated Savings Systems. This position requires knowledge of testing methods and requirements as well as experience in creating and executing test plans. An excellent grasp of OS/JCL is necessary and experience with HOGAN Integrated Banking Software strongly desired.

UNIT MANAGER-QUALITY ASSURANCE

Matrix Manager for the technical staff. Will provide Technical Projects Coordination for all systems participating in Assurance Testing. Person will lead team of four analysts. Position requires background in programming and technical support. Experience desired in large-scale IBM environments under IMS DB/DC. HOGAN software exposure preferred as is experience in the Banking/Savings and Loan Industry.

SENIOR PROGRAMMER ANALYST-REAL ESTATE DEVELOPMENT SYSTEMS

Will develop new Automated Loan Origination System and help direct activities of junior programming staff. Position requires experience in Real Estate Loan Origination Systems as well as HOGAN Integrated Banking Software and IMS DB/DC.

SENIOR PROGRAMMER ANALYST-FINANCIAL SYSTEMS

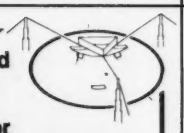
Will work on a new On-line Human Resources Management System using the INSCI HR package. Person should have a background in designing and coding HR/Payroll/Personnel systems and experience with IMS DB/DC. Previous software package experience would be a definite plus.

Great Western offers a highly competitive salary and benefits package and excellent working environment in the San Fernando Valley. If you are interested please send resume and salary history to: Great Western, P.O. Box 1030, Northridge, CA 91328, Attn: Richard LoCicero, Technical Recruiter.

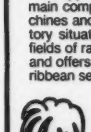
We are an equal opportunity employer M/F/H. Principals only.

GREAT WESTERN GW

The National Astronomy and Ionosphere Center has a position open at The Arecibo Observatory for Head of the Computer Group



The Arecibo Observatory, site of the world's largest radio/radar telescope, invites applications for the position of head of its computer group. This is a small group so the selected individual will be expected to manage the department and to be actively involved in software development. A strong background in systems and, preferably, real time applications such as radar signal processing is needed. The main computing hardware consists of Harris H1000 and H800 machines and a VAX/750 operating under VMS. The Arecibo Observatory situated in Puerto Rico supports pre-eminent research in the fields of radio astronomy, radar astronomy and atmospheric science and offers a challenging high-technology environment in a sunny Caribbean setting. As a Cornell University employee, benefits would include TIAA/CREF, medical and life insurance, tuition for English language school, 18 days vacation annually and a relocation package.



Reply including resume to:
Dr. D.B. Campbell
Director
Arecibo Observatory
P.O. Box 995
Arecibo, Puerto Rico 00613

Data Processing Opportunities In Florida

Embry-Riddle Aeronautical University invites applications for the following positions located in Daytona Beach:

MANAGER, ADMINISTRATIVE D/P APPLICATIONS DEVELOPMENT

Responsibilities include supervision of applications development staff (13), project management and control, and user and management interaction. 4-year computer related degree, a successful record in project management and systems analysis and design, 3 years of applicable supervisory experience, and 2-3 years experience with HP3000, Image Database and COBOL required. College/University DP background and knowledge of COGNOS products preferred.

SYSTEMS ANALYST

Provides systems analysis and design, assists management in the planning of automation requirements, functions as a project leader providing technical leadership and provides a link between users and data processing dept. A computer-related degree and a minimum of 2 years experience as a Systems Analyst or Programmer/Analyst using COBOL is required. HP3000, COGNOS and College/University experience preferred.

Salary commensurate with experience. Excellent benefits package. Send resume and salary history in confidence to:

Embry-Riddle Aeronautical University
UA Personnel Office
Star Route Box 540
Bunnell, FL 32010
904-673-3180 ext 133

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We urgently require **Programmer/Analysts** for long-term contracts, all locations with any of the following:

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Additionally, if you are looking for a contract send your resume or call now and register.

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- Determine software requirements; evaluate system effectiveness; design, implement and maintain new systems and programs; problem solving and system correction. Duties will involve extensive use of Burroughs mainframe computer hardware, COBOL, DMS II and GEMCOS. B.A. in Comp. Sci., Math/Statistics or Engineering and 2 yrs. in job offered or 2 yrs. related computer programming and systems analysis exp. 40 hrs./wk., $35,000/yr. D.O.T. 012167066. Mail resume to NYS Job Service, JO # NY8006779, 97-45 Queens Blvd., Rego Park, NY 11374.

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ProTec is an expanding UNIX-oriented consulting firm seeking senior software developers. Prefer MS PhD in Comp Sci EE with strengths in UNIX (Syst V or 4.2 BSD) C or Shell telecommunications switching systems DB development or networking. We are UNIX specialists offering a very competitive salary and benefits package plus the opportunity to work with the best in the field.

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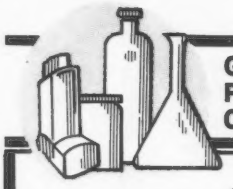

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As a key member of our Biostatistics team, the Senior Clinical Programmer will provide database management support for Glaxo's gastrointestinal product area. Major responsibilities include designing, establishing, validating and maintaining clinical trials databases.

Position requires a Bachelor's Degree in Computer Science or related field with 3-5 years programming experience. Candidate must also possess strong analytical skills, database knowledge and skills, as well as good interpersonal and communication skills. Experience with ORACLE or INGRESS in a VAX environment is highly desirable.

Your abilities and potential will be recognized with a competitive starting salary and benefits package. Our location offers a mild climate year round, access to some of the finest universities in the country, numerous cultural activities and nearby recreational facilities. For prompt consideration, please forward your resume, including salary history, to:

Dept. 86-323E-CW

(No Phone Calls, Please)

No Private Agency Referrals, Please

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(305) 898-9027

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Bala Cynwyd, PA 19004
(215) 667-2990

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San Bruno, CA 94066
(415) 952-5010

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Norwalk, CT 06851
(203) 847-6600

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4/5

PROGRAMMER/ANALYST

Ever considered Tampa/St. Petersburg, Florida! If you have 3 or more years of experience in the following areas, WE NEED YOU:

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IDMS ADS/O
MODEL 204

We are a rapidly growing company with highly competitive salaries and excellent benefits. Send resume to:

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Tampa, FL 33629-9893
Attn: Warren Leister

MIAMI UNIVERSITY

Associate Director, The Computing Center

Responsible for performing the duties of Associate Director of The Computing Center at a state-assisted university. Position is currently available; reports to the Director, The Computing Center, and organizationally is in the University's Division of Finance and Business Affairs. Specific responsibilities include assisting with the management and supervision of The Computing Center staff and activities; directing the computer security control program; developing, implementing and maintaining a computer resource and data disaster recovery plan, and assisting with technical, space and environmental planning. Duties also include performing all aspects of personnel supervision, assuming responsibility for the department in the Director's absence and performing other assigned duties as requested.

Qualified candidates will have significant, progressively responsible administrative experience in a data processing environment. A bachelor's degree in a relevant field is preferred. Demonstrated administrative abilities, and effective communication and supervisory skills are essential.

Send complete resume, including salary history and the names, addresses and telephone numbers of at least three references to: **Associate Director of Personnel, Room 2, Roudebush Hall, Miami University, Oxford, Ohio 45056**

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IN EDUCATION AND EMPLOYMENT M/F/H

SENIOR SYSTEMS PROGRAMMER MVS/XA (SMPE)

Prestigious Memphis Financial Institution seeks 3-yr internal XA Systems Programmer. Expansion position. Great benefits. $42,000. Contact Jeff Thompson.

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(901) 763-1133

PROGRAMMER: Systems analysis, design and programming; database creation and software development for international pricing, reservations, ticketing and fare quote operating systems and applications. Testing, coding and debugging of new software using computer circuit diagrams, model building and data flowcharts. Evaluate system efficiency. IBM hardware, BAL, PL-1 and passenger airline reservation systems (PARS). Must have min 2 yrs exp as systems analyst/programmer using PL-1 and BAL; ability to work in offline and online environments; exp in database creation and systems interface; ability to solve complex problems through logic and scientific thinking. Hrs Mon-Fri 7am-4pm. Salary: $2,100/mo. Send resume only to Job Service Of Florida, 1350 NW 12th Avenue, Room 280, Miami, Florida 33242. REF: Job Order # 4539594.

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Currently recruiting experienced computer pros with background in any of the following: IBM Cobol; CICS; IDMS; IMS; Adabas; Oracle; DB2 SQL; ADR Datacom or Ideal; APL; PL 1; Financial; Mfg; Banking; Claims Processing; MSA; MVS; NCP; VTAM; ACP or DEC VAX Systems Progrs; DASD Mgmt.; Capacity Planners; DB Analysts; DP Auditor; HP1000; DEC VAX Mfg; DG; Method 1; Spectrum 2; SDM; Pride. Partial listing of local, regional & nat'l fee paid positions. Call or write:

The Underwood Group, Inc.
3924 Browning Pl. Suite 7
Raleigh, NC 27609
(919) 782-3024

Systems Analyst-EDP - Modify, update and redesign present management information and data processing systems to generate required data and reports; develop database; write program specifications if needed. Use Burroughs mainframes, DMSII, WFL, CANDE, and LINC. Bachelor's degree in Management Information Systems. 2 years experience performing above. 40 hours per week. $37,500 per year. Mail resume: NYS Job Service, JO #NY8013774, 175 Remsen St., 2nd Floor, Brooklyn, NY 11201. DOT 012167066.

Systems Programmer/ Analyst (Manager)

Manage installation of ACP cargo reservation systems. Require Bachelor's or equivalent (9 months professional experience is equivalent to 1 year of education) in data processing or computer science and 5 years experience including ACP/TPF, CARGO and prior project management. Salary is $45,000 per annum. Job location: Los Angeles, CA. Resume to:

CW-B4882
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DIRECTOR OF INFORMATION SYSTEMS

Atlanta, Georgia

We are the nation's largest furniture rental, sales and manufacturing firm. We run multiple IBM System/38 computers and intensive communications. We are seeking an individual to head up our Information Systems Department. The right person will meet the following requirements:

- At least 10 years of Data Processing experience.
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- Heavy financial and retail inventory applications background.
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- Knowledge of point-of-sale applications & equipment (micros, etc.) would be helpful.

The position reports to the Vice President of Finance and includes a standard benefits package. Send your confidential resume to:

VICE PRESIDENT OF FINANCE
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ATLANTA, GA 30355

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- Develop software system with Korean and English character files, using Hangui DBMS, C and Cobol languages, plan future coding of projects. Hardware used is IBM PC, ATT, UNIX PC, Televideo. Must speak, read, write Korean. 40 hours per week. 9am-5pm. $30,000 per year. Masters Computer Science required. 1 year and 6 months experience required or 1 year and 6 months experience as a Computer Programmer required. DOT code 012.-167.066. Mail resume to NYS Job Service, Order # NY8017672, 97-45 Queens Blvd., Rego Park, NY 11372.

ATTENTION IBM VM AND VSE SYSTEMS PROGRAMMING GURUS

Are you tired of being considered an overhead expense? Are you ready to work for a company that *specializes* in operating systems support? Are you the BEST at what you do? Do you do it right the *first* time, every time? Do you want to work for a company that will recognize and reward your superior abilities?

If so, you may qualify for a position with OPSYS. Our Central and South Florida branches are expanding and we are looking for a few good senior systems programmers.

If you can handle technical challenge and project responsibility, please send your resume and other pertinent data to:

OPSYS

2301 Lucien Way, Suite 120
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Attn: Personnel Dept.

EOE Principals only

Senior IMS Systems Analyst

to interface with all levels of end-user management and supervise three-five Programmer/Analysts in design and implementation of new systems. Determine hardware and software needs, develop release control procedures, oversee technical installation, statistical analysis, maintenance of systems, systems testing, debugging and code inspection. Must apply knowledge of IBM's Information Management System (IMS). High School grad plus five years experience or five years experience in systems analysis and design and references required. Mail resumes to NYS Job Service, 175 Remsen Street, Second Floor, Brooklyn, New York 11201. Job Order # NY8001408 DOT Code 012167066.

CLASSIFIED ADVERTISING ORDER FORM

Issue Date: Ad closing is every Friday, 10 days prior to issue date.

Sections: Please be sure to specify the section you want: Micro Products & Services, Buy Sell Swap, The Bulletin Board, Software for Sale, Time & Services, Position Announcements. (Available upon request: Positions Wanted, Software Wanted, Real Estate, Education, Business Opportunities, Bids and Proposals, Auctions, Publications, Seminars and Conferences).

Copy: We'll typeset your ad at no extra charge. Please attach clean typewritten copy. Figure about 25 words to a column inch, not including headlines. Any special artwork should be enclosed with your ad also. Logos must be submitted on white bond paper for best reproduction.

Cost: Our rates are $176.40 per column inch. (A column is 1 13/16" wide.) Minimum size is two column inches (1 13/16" wide by 2" deep) and costs $352.80 per insertion. Extra space is available in half-inch increments and costs $88.20. Box numbers are $15.00 extra, per insertion.

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Knowledge of FORTRAN, "C", and UNIX.

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Experience in simulation and modeling.

DIAGNOSTICS
Knowledge of FORTRAN, "C", and one assembly language.

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Expertise in the design of CPU, memory and I/O subsystems. Experience in ECL is preferred.

All of the above positions require an appropriate college degree or equivalent. Relevant industry design experience expected.

Leading edge technology, and the famed beauty and quality of life in the majestic Pacific Northwest help make the choice even easier. For prompt consideration, send your resume, in confidence to: **FLOATING POINT SYSTEMS, INC., Attention: Bob Clay, PO Box 23489 CW-01, Portland, OR 97223. For questions, call: 1-800-547-5627.** Equal Opportunity Employer.

FPS FLOATING POINT SYSTEMS, INC.

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SPSS Inc. is a progressive, global leader in the development of quality data analysis and graphic software with thousands of installations in 90 countries. If you're an experienced Software Engineer seeking an exciting career, this is an immediate opportunity.

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In return, we would be pleased to reward you with an excellent salary, comprehensive benefits, growth opportunities and an attractive location with a challenging and creative environment, convenient to the vibrant Minneapolis/St. Paul area. For confidential consideration, please send your resume to:

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If you have programming experience in a major systems consulting environment ("Big Eight" or equivalent) and would like to move to a fast-paced, challenging environment, Morgan Stanley has career opportunities available.

We are searching for a select few who have the intelligence, discipline and initiative to dedicate all of their skills and energy to pursuing a unique career opportunity.

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MORGAN STANLEY

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EOE M/F/H/V

Migration hard for users

Many choices, few tools to move from System/36

BY STANLEY GIBSON
CW STAFF

Users of IBM's System/36 minicomputer seeking more power confront hard choices, ranging from converting to an IBM System/38, ordering an IBM 9370 or moving to another vendor's equipment.

No matter which option users decide on, each requires a complex conversion. And looming over the horizon is an as yet unannounced, but much discussed, future System/38 machine.

Despite IBM's efforts to market the System/36 and 38 as a mid-range continuum, System/36 users who convert to a System/38 seldom do so without major difficulty.

'Bloody' conversions

"In the past, all conversions have been described as bloody at best," said Rodger Peck, a System/36 consultant and president of Peck Systems Group in Bridgman, Mich.

Last June, IBM announced software that would convert System/36 code to run on the System/38. The bridge is viewed by some as a temporary patch and a prelude to a more complete machine that will amalgamate the two architectures, to be introduced next year.

One user was told directly of the machine when he was making a decision on converting to a System/38. Gerard DiStefano, MIS director for Standish, Ayer and Wood, Inc., an investment management firm in Boston, traveled to Rochester, Minn., for a briefing on the future of IBM's mid-range. DiStefano was told that the System/38 CPU will be further expanded and will be the foundation of the combined System/36 and 38 line through the 1990s. And the capabilities of the System/36 will be blended into the new box.

"They indicated the System/38 architecture was the wave of the future and a new box would be out in 18 to 24 months. It sounded like the System/36 Model D was the end of the line," he said. An IBM spokesman would not comment on what DiStefano was told.

The MIS director ultimately opted to move to a System/38, even though doing so will mean facing severe obstacles.

DiStefano is allowing approximately one year for his conversion from the System/36 to the 38. In the process he will rewrite some 1,500 programs. He will also continue to use a System/36 machine in conjunction with the 38. This will present some problems in that a System/36 user will be able to access documents on the System/38 but will not be able to update them, he said.

DiStefano said he has confidence in his decision, despite being told by IBM that it would be impossible to upgrade from the System/38 he will soon own to the coming machine.

Migration 'bugs me'

DiStefano termed the impossibility of a hardware migration "very unfortunate. It bugs me." Nonetheless, he was assured that CPF and RPT3 software will run on the new machine. "Our investment [in software] won't be wasted," he said.

Some consultants maintain that going to a 38 is the least painful option facing System/36 users who are running out of capacity. "While the System/36-to-38 conversion is difficult, it will be less traumatic than going to a 9370 or another vendor," said Charles Massoglia, president of Massoglia and Associates, Inc. in East Lansing, Mich. He said that he allows 90 days for a full conversion from a System/36 to a 38.

"It is not an automated conversion. There is manual work involved," he stressed, despite the fact that a user may employ IBM's code-conversion facility.

And despite speculation that the System/36 will be eclipsed by the new System/38-based machine and that the System/38 line may be overshadowed by the 9370 line, IBM is evidently making a large marketing push in trying to sell the System/36.

One industry analyst reported that IBM has assigned sales representatives to do nothing but sell System/36s in competitive situations. Another observer said IBM reps are being given System/36 quotas to meet, rather than a cumulative dollar figure that could be attained by selling a few large mainframes.

For users who buy the System/36 now, the ability of its software to run on the future System/38 machine would appear to be critically important. Users like DiStefano have been assured that will be the case. And consultants such as Massoglia, who work closely with IBM machines, are convinced that IBM will continue to foster three architectures — the current System/36 and 38, the 370 and the PC — assuring a hardware platform for software written for current System/36 and 38 machines.

However, John McCarthy, an industry analyst with Forrester Research, Inc. in Cambridge, Mass., offered a differing view. "I wouldn't migrate to the System/38 with the 9370 coming. I'd go to a DEC VAX or a Wang Laboratories, Inc. VS, because those are the strategic products of those companies."

Criminal past

FROM PAGE 1

ecutive Committee," said Tom Doeppner, chairman of the institute's Capitol-Area Executive Council. "I don't feel it's incumbent upon me or anyone else in the IEEE to notify our people about anything either good or bad in someone's personal history," Doeppner said during a recent phone interview.

Of the 30 or 40 members who were present at Rifkin's election, none has formally protested his candidacy before the association's Ethics Committee, although "probably at least half the voters knew the full story," Doeppner said.

What some of the local IEEE members do find objectionable, however, is the section leadership's suppression of possibly relevant information about a candidate's professional background. Much of the rank and file was unaware of Rifkin's former Security Pacific ties, even as he was running for office. Last May, he succeeded in his effort to win election as a section director — a post he is scheduled to hold until mid-1988 when his two-year term expires.

"I'm probably one of the few people in the local organization who did know about Rifkin's background," said Stuart Katzke, an IEEE member and National Bureau of Standards (NBS) security specialist.

'No reference'

Rifkin declined to respond directly to questions about his and the IEEE's failure to inform its members about his background.

Ray Pickholtz, vice-president of the IEEE's Communications Society and professor of electrical engineering at George Washington University in Washington, D.C., said he did not know about Rifkin's background. Although Pickholtz votes regularly in the association's elections, "no reference to Mr. Rifkin as an ex-convict ever came to my attention," he said.

Because most IEEE members interact only minimally with the association's sections, which are primarily administrative bodies, the vast bulk of Rifkin's constituents "probably have no idea who he is," Pickholtz added.

Nor is his relative anonymity confined just to his own backyard, where he heads McLean, Va.-based Master Systems, Inc., a systems consulting company. When reached recently by phone at the association's New York headquarters, IEEE President Bruno Weinschel denied any knowledge of Rifkin's previous scrape with the law.

For the most part, the local IEEE members who already know about Rifkin's criminal record have few qualms about his current position per se. "People who make amends for their past mistakes deserve a second chance and shouldn't be hounded for the rest of their lives," Katzke said. Among the most vocal critics is locally based IEEE fellow Carl Hammer, a retired Sperry Corp. luminary. The section's top leaders failed "to tell the whole truth and nothing but the truth," Hammer said.

> "I DON'T feel it's incumbent upon me or anyone else in the IEEE to notify our people about anything either good or bad in someone's personal history."
>
> TOM DOEPPNER
> IEEE'S CAPITOL-AREA
> EXECUTIVE COUNCIL

To support his contention, Hammer cited two omissions in the official printed announcement of Rifkin's candidacy.

In the April 1986 issue of its monthly publication, "Scanner," the section ran thumbnail biographies of Rifkin and eight other aspiring local officeholders.

Although Rifkin's material mentioned his 20 years of professional experience, it contained no references to his imprisonment. Moreover, of the nine announcements, only Rifkin's lacked a photograph, which "might have made him recognizable," Hammer said.

During a brief interview last week, Rifkin blamed the absence of his photo not on any attempt to avoid recognition but on technical problems beyond his control. "I sent them my picture in time to make their publication deadline, but they couldn't use it because of poor contrast or something like that," he said.

"Scanner" Editor Jim Strother, however, remembers the incident somewhat differently. "With the press of his other business, he just wasn't able to find a place to make a picture that he could get to me on time," Strother said.

Hammer's view that the section's officers erred in withholding information about Rifkin and the Security Pacific affair is shared by the NBS's Katzke. "Whenever an ex-convict runs for office in a professional association, it's incumbent on the appropriate officers to inform the membership of his full background," he said. "I'm willing to forgive someone who has truly reformed, but I'd like to make my own decision about whether he has, in fact, done so."

Rifkin himself, when asked to comment on the issue, referred the inquiry to others in the association.

Permissible under bylaws

IEEE's Doeppner said that Rifkin's election is permissible under the institute's bylaws, which contain no provisions expressly forbidding an ex-convict from holding an IEEE office.

Some of the local section's rank and file find Doeppner's point about the bylaws compelling. "If our own rules permit a felon to serve in an official capacity, I guess I don't have any problems with it," IEEE member Denny Bransted said.

According to the brief biography that accompanied the formal announcement of his candidacy, Rifkin has served successively as vice-chairman and chairman of the IEEE Computer Society's local chapter. In the latter role, he once shared an award for running the section's best chapter, "Scanner" Editor Strother said.

Paperback Software adds graphics package

BERKELEY, Calif. — Paperback Software International will announce in March an object-oriented business graphics program, VP Graphics, that will implement spreadsheet files in a variety of chart designs.

Unlike some other presentation graphics packages that run on the IBM Personal Computer and compatibles, VP Graphics is object-oriented rather than raster-based, said Steve Cook, project manager.

The user can manipulate or move portions of a drawing as whole segments, rather than as fragments of the picture that leave a hole when removed. Images are saved as whole objects rather than bit-mapped parts.

The $99.95 program reads PIC files from VP Planner, a paperback software spreadsheet, Lotus Develpment Corp.'s 1-2-3, and similar formats, Cook said. VP Graphics can also generate charts from DIF and ASCII files.

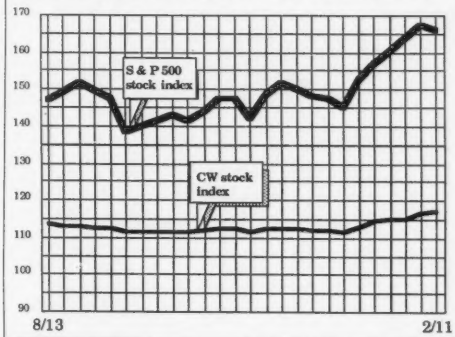
VP Graphics also offers what-you-see-is-what-you-get, so that screen images accurately reflect the printer or plotter output.

The program supports any Microsoft Corp.-compatible mouse, as well as IBM Enhanced Graphics Adapter, Color Graphics Adapter and Hercules Computer Technology, Inc. graphics formats.

VP Graphics will have a driver that can communicate with any printers or plotters that use Adobe Systems, Inc.'s Postscript page-description language.

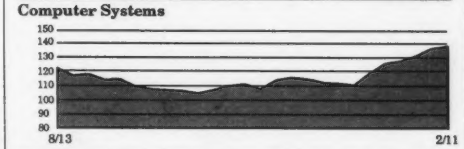
PEGGY WATT

STOCK TRADING INDEX



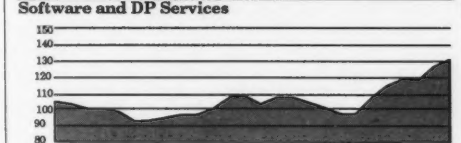
Indexes	*Last Week*	*This Week*
Computer Systems	136.1	**138.1**
Supplies & Accessories	157.8	**160.8**
Software & DP Services	126.6	**131.3**
Semiconductors	100.1	**106.3**
Peripherals & Subsystems	125.9	**127.6**
Leasing Companies	113.3	**117.2**
Composite Index	116.3	**116.8**
S&P 500 Index	167.2	**166.0**

Computer Systems

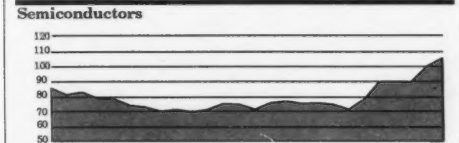


Supplies and Accessories

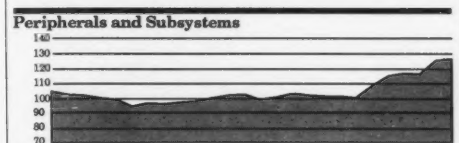
Software and DP Services



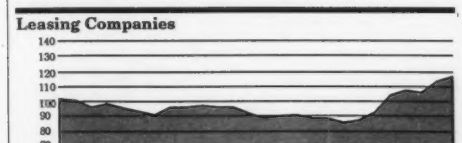
Semiconductors



Peripherals and Subsystems



Leasing Companies



CW CHARTS: LESLIE J. MILLER

Stock trading summary

CLOSING PRICES WEDNESDAY, FEBRUARY 11, 1987

Computer Systems

EXCH		52-WEEK RANGE (1)		CLOSE FEB 11 1987	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALPHA MICROSYSTEMS	8	4	4.38	+0.3	+6.1
O	ALTOS COMPUTER SYS	19	10	15.50	+0.6	+4.2
A	AMDAHL CORP	36	14	34.63	+0.1	+0.4
O	APOLLO COMPUTER INC	22	9	21.00	-0.6	-2.9
O	APPLE COMPUTER INC	57	23	56.50	+1.5	+2.7
N	AT&T	28	21	23.88	+0.3	+1.1
O	C P T CORP	7	3	3.63	+0.1	+3.6
N	COMPAQ COMPUTER CORP	29	12	29.25	+1.5	+5.4
A	COMPUTER CONSOLES INC	12	6	11.25	+1.1	+11.1
O	CONCURRENT COMP CORP	25	11	14.88	-0.1	-0.8
N	CONTROL DATA CORP	30	20	29.50	+0.6	+2.2
O	CONVERGENT TECH	13	4	10.38	+0.1	+1.2
N	CRAY RESH INC	121	63	119.00	+5.8	+5.1
O	DAISY SYS CORP	20	8	12.00	+0.8	+6.7
N	DATA GEN CORP	48	25	36.00	+0.0	+0.0
N	DATAPOINT CORP	9	4	5.63	-0.3	-4.3
N	DIGITAL EQUIP CORP	153	76	150.38	+3.8	+2.6
N	FLOATING POINT SYS INC	46	11	15.00	+0.8	+5.3
N	GOULD INC	30	15	20.25	+1.3	+6.6
N	HARRIS CORP	40	27	37.38	-0.9	-2.3
N	HEWLETT PACKARD CO	55	36	53.13	-0.1	-0.2
N	HONEYWELL INC	84	58	67.00	+1.1	+1.7
N	IBM	162	116	134.00	-1.1	-0.8
O	IPL SYS INC	4	1	2.13	-0.1	-5.6
N	ITT CORP	62	41	61.38	+1.9	+3.2
N	M A COM INC	19	12	14.13	-0.4	-2.6
N	MATSUSHITA ELEC INDL LTD	136	64	122.88	-2.1	-1.7
O	MENTOR GRAPHICS CORP	27	11	24.38	-1.5	-5.8
N	NBI INC	14	8	10.50	-0.3	-2.3
N	NCR CORP	61	40	58.63	-0.1	-0.2
N	PRIME COMPUTER INC	28	16	22.13	-0.1	-0.6
O	STRATUS COMPUTER	34	17	31.00	-1.0	-3.1
O	SYMBOLICS INC	15	4	4.75	+0.3	+5.6
O	TANDEM COMPUTERS INC	59	22	56.63	-0.5	-0.9
N	TANDY CORP	51	31	50.88	+2.8	+5.7
N	TEXAS INSTRS INC	160	103	159.00	+3.5	+2.3
A	ULTIMATE CORP	35	13	25.50	+1.6	+6.8
N	UNISYS	103	58	103.00	+6.9	+7.2
A	WANG LABS INC - B	22	11	14.88	-0.3	-1.7
A	WANG LABS INC - C	22	11	15.13	-0.3	-1.6
N	XEROX CORP	72	49	69.00	+1.0	+1.5

Supplies & Accessories

EXCH		52-WEEK RANGE (1)		CLOSE FEB 11 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMER BUSINESS PRODS	37	23	29.63	+0.1	+0.4
N	BARRY WRIGHT CORP	25	14	20.25	+2.4	+13.3
A	DUPLEX PRODS INC	23	18	20.75	-0.4	-1.8
N	ENNIS BUSINESS FORMS INC	34	22	32.50	+0.8	+2.4
N	3M CO	140	95	131.00	+1.9	+1.5
N	MOORE LTD	28	20	24.38	+0.9	+3.7
O	STANDARD REGISTER CO	50	32	42.25	-1.8	-4.0
N	WALLACE COMPUTER SVCS	50	37	45.38	-0.3	-0.5

Software & DP Services

EXCH		52-WEEK RANGE (1)		CLOSE FEB 11 1987	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	7	3	4.50	+0.3	+5.9
N	ADVED SYS INC	20	12	19.75	+0.3	+1.3
N	AGS COMPUTERS INC	37	17	34.38	-1.6	-4.5
O	AMERICAN MGMT SYS INC	31	12	29.00	+0.5	+1.8
O	AMERICAN SOFTWARE INC	23	9	21.00	+0.0	+0.0
N	ANACOMP INC	7	3	6.38	+0.4	+6.3
O	ANALYSTS INTL CORP	10	4	10.00	+0.8	+8.1
O	ASHTON TATE	30	10	28.00	+0.3	+0.9
O	ASK COMPUTER SYS INC	16	9	16.13	+2.9	+21.7
O	ASTRADYNE COMP IND	3	1	1.91	+0.1	+5.2
N	AUTOMATIC DATA PROC	47	29	43.00	-1.6	-3.6
O	BOOLE & BABBAGE INC	11	4	10.75	+2.8	+34.4
N	COMPUTER ASSOC INTL INC	44	17	42.25	-0.6	-1.5
O	COMPUTER HORIZONS CORP	14	10	13.13	+0.5	+4.0
O	COMPUTER NETWORK TECH	10	4	5.38	+0.1	+1.2
N	COMPUTER SCIENCES CORP	53	30	50.75	-0.5	-1.0
O	COMPUTER TASK GROUP INC	19	11	17.00	+2.6	+18.3
O	COMPUTONE SYS INC	6	0	0.19	+0.0	+0.0
O	COMSHARE INC	16	10	14.13	+0.9	+6.6
N	CULLINET SOFTWARE INC	17	6	11.13	+1.1	+11.3
O	CYCARE SYS INC	17	7	9.00	+0.0	+0.0
O	DUQUESNE SYS INC	33	18	44.50	-3.0	-6.3
N	GENERAL ELEC CO	104	71	99.38	-0.9	-0.9
N	GENERAL MTRS CORP	50	24	36.75	+0.8	+2.1
O	HOGAN SYS INC	15	7	13.75	-0.1	-0.9
O	INFORMATION SCIENCES INC	4	1	1.13	+0.3	+28.6
O	INFOTRON SYS CORP	19	7	10.00	+0.5	+5.3
O	KEANE INC	16	5	8.75	+0.8	+9.4
N	LOGICON INC	38	22	27.00	+0.0	+0.0
O	LOTUS DEV CORP	74	21	73.50	+4.8	+6.9
O	MANAGEMENT SCI AMER	21	11	20.88	+0.6	+3.1
O	MCI COMM CORP	13	5	5.63	+0.4	+7.1
O	MICOM SYS INC	20	10	17.00	+0.5	+3.0
O	MICRO PRO INTL CORP	5	2	4.00	-0.3	-7.3
O	MICROSOFT CORP	78	26	71.75	-0.3	-0.3
O	NATIONAL DATA CORP	27	16	25.38	+1.0	+4.1
O	ON LINE SOFTWARE INT	19	10	18.50	-0.1	-0.7
O	ORACLE SYS CORP	32	13	31.25	+2.3	+7.8
N	PANSOPHIC SYS INC	42	25	38.75	-1.8	-4.3
O	POLICY MGMT SYS CORP	30	15	27.00	-1.0	-3.6
O	PROGRAMMING & SYS INC	11	8	9.25	+0.3	+2.8
O	REYNOLDS & REYNOLDS CO	42	27	35.25	+1.0	+2.9
O	SCIENTIFIC COMPUTERS INC	8	4	7.88	+0.4	+5.0
O	SEI CORP	28	15	23.25	-1.5	-6.1
O	SHARED MED SYS CORP	51	30	49.25	-1.3	-2.5
O	SOFTWARE AG SYSTEMS INC	22	10	15.25	+0.1	+0.8
O	SOFTWARE PUBG CORP	11	5	11.38	+0.3	+2.2
A	STERLING SOFTWARE INC	21	10	12.63	-0.6	-4.7
N	SUNGUARD DATA SYSTEMS	20	10	19.63	+3.1	+18.9
N	UNILOGIC CORP	33	16	31.13	+0.8	+2.5
N	URS CORP	20	11	18.50	-0.4	-2.0
O	VM SOFTWARE INC	37	12	37.13	+1.1	+3.1

Semiconductors

EXCH		52-WEEK RANGE (1)		CLOSE FEB 11 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADVANCED MICRO DEV	34	13	22.50	+1.5	+7.1
N	ANALOG DEVICES INC	25	14	21.63	+0.3	+1.2
O	ANALOGIC CORP	15	10	12.00	-0.5	-4.0
N	APPLIED MAGNETICS CORP	24	13	23.00	+0.6	+2.8
O	AVANTEK INC	23	14	17.75	+1.4	+8.4
O	HADCO CORP	6	3	5.00	+1.3	+33.3
O	INTEL CORP	39	16	38.13	+3.5	+10.1
O	MICRO MASK INC	7	2	5.00	+0.3	+5.3
N	MOTOROLA INC	50	34	49.38	+1.1	+2.3
N	NATIONAL SEMICONDUCTOR	16	8	15.25	+0.5	+3.4
N	TERADYNE INC	30	16	23.38	-0.6	-2.6

Peripherals & Subsystems

EXCH		52-WEEK RANGE (1)		CLOSE FEB 11 1987	WEEK NET CHNGE	WEEK PCT CHNGE
A	AM INTL INC	9	5	7.63	-0.1	-1.6
B	ANDERSON JACOBSON INC	3	1	2.19	+0.2	+9.4
O	AST RESH INC	27	11	18.63	+0.9	+4.9
O	AUTOTROL CORP	10	5	8.75	+0.3	+2.9
O	AVANT GARDE COMPUTING	7	3	4.00	-0.4	-8.6
O	BANCTEC INC	13	6	12.38	+0.0	+0.0
N	BOLT BERANEK & NEWMAN	53	36	53.13	+3.1	+6.3
B	CETEC CORP	9	5	5.75	+0.8	+15.0
O	COGNITRONICS CORP	6	2	3.13	+0.0	+0.0
B	COMPUGRAPHIC CORP	27	16	21.75	-0.5	-2.2
N	COMPUTERVISION CORP	23	10	22.00	-0.5	-2.2
N	CONRAC CORP	18	12	15.50	-0.4	-2.4
A	DATAPRODUCTS CORP	18	11	14.50	-0.1	-0.9
B	DATARAM CORP	18	7	9.00	+0.4	+4.3
O	DATA SWITCH CORP	9	5	7.25	-0.4	-4.9
O	DATUM INC	7	4	6.25	+0.1	+2.0
N	DECISION INDS CORP	15	8	11.50	-0.1	-1.1
O	ENDATA INC	9	4	9.00	+0.4	+4.3
O	EMC CORP	28	11	28.00	+3.0	+12.0
O	EVANS & SUTHERLAND	33	20	31.75	-0.3	-0.8
N	FLOATING POINT SYS INC	46	11	15.00	+0.8	+5.3
O	GANDALF TECHNOLOGIES	9	5	8.50	-0.3	-2.9
N	GENERAL DATACOMM IND	15	8	12.13	-0.4	-3.0
N	HAZELTINE CORP	30	16	29.75	+0.0	+0.0
O	ICOT CORP	13	8	10.38	-0.1	-1.2
O	INFORMATION INTL INC	18	13	14.25	+0.0	+0.0
O	INTECOM INC	7	3	3.00	+0.0	+0.0
O	INTERLEAF INC	15	8	11.38	+1.1	+11.0
O	MEDIADATA CORP	7	2	6.50	+1.4	+26.8
A	MSI DATA CORP	15	10	14.25	+0.4	+2.7
N	NASHUA CORP	29	18	28.25	+1.5	+5.6
O	NETWORK SYS CORP	19	10	18.13	-0.3	-1.4
N	NORTH AMERN PHILIPS CORP	48	35	43.50	+1.3	+3.0
N	NORTHERN TELECOM LTD	43	27	41.00	-1.4	-3.2
O	NOVELL INC	40	14	36.00	-3.8	-9.4
N	PARADYNE CORP	11	4	5.63	+0.3	+4.7
A	PENRIL CORP	9	4	5.75	+0.4	+7.0
B	PLESSEY PLC	38	24	31.31	-0.4	-1.4
O	PRINTRONIX INC	15	10	12.00	-0.1	-1.0
O	QMS INC	16	10	10.13	+0.0	+0.0
O	RAMTEK CORP	7	3	5.25	-0.3	-4.5
N	RECOGNITION EQUIP INC	27	10	20.00	+1.1	+6.0
O	SCAN TRON CORP	19	11	11.75	-0.8	-6.0
N	SCIENTIFIC ATLANTA INC	15	9	14.25	-0.8	-5.0
O	SEAGATE TECHNOLOGY	35	9	35.13	+2.6	+8.1
N	STORAGE TECHNOLOGY	7	2	4.25	+0.3	+6.3
O	SUN MICROSYSTEM INC	32	11	29.25	-0.6	-2.1
A	T-BAR INC	8	5	8.00	+0.0	+0.0
A	TAB PRODS CO	18	12	17.25	+0.6	+3.8
O	TANDON CORP	8	2	3.63	+0.0	+0.0
A	TEC INC	7	3	3.75	-0.1	-3.2
N	TEKTRONIX INC	42	27	37.38	-3.6	-8.8
O	TELEVIDEO SYS INC	4	2	2.63	+0.0	+0.0
N	TELEX CORP	90	52	88.25	+5.9	+7.1
N	TIMEPLEX INC	36	14	34.13	-0.9	-2.5
B	TITAN CORP	12	6	7.75	+0.0	+0.0
O	VISUAL TECHNOLOGY INC	1	0	0.44	+0.0	+0.0
O	WYSE TECH	26	12	25.13	+0.4	+1.5

Leasing Companies

EXCH		52-WEEK RANGE (1)		CLOSE FEB 11 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	COMDISCO INC	25	15	24.50	+0.6	+2.6
N	CONTINENTAL INFO SYS	12	7	10.50	+0.0	+0.0
O	FINALCO GROUP INC	5	2	3.00	+0.0	+0.0
O	PHOENIX AMERN INC	8	3	7.38	+1.1	+18.0
O	SELECTERM INC	12	5	5.81	+0.0	+0.0
N	U.S. LEASING	49	38	48.75	+0.3	+0.5

EXCH: N – NEW YORK; A – AMERICAN; P – PACIFIC; B – BOSTON; L – NATIONAL; M – MIDWEST; O – OVER-THE-COUNTER; S – SPLIT

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID

(1) TO NEAREST DOLLAR

Chip stocks seesaw

Semiconductor firms ride waves of investor perception

Semiconductor stocks last week provided a lesson in how industry perceptions affect market activity.

On Tuesday, the stocks took a beating after the Semiconductor Industry Association (SIA) urged stricter enforcement of last summer's trade pact with Japan; investors interpreted the SIA plea as a negative sign for industry prospects.

On Wednesday, however, stocks surged on the expectation of a strong January book-to-bill ratio to be announced by the SIA. But when the ratio was below expectations, the chip stock prices fell accordingly.

Giving the changes in price each day and Thursday's closing price, two examples of this phenomenon are Texas Instruments, Inc., down 6½, up 7, down 3⅜, close 155⅛; and National Semiconductor Corp., down ⅛, up 1, down ⅜, close 14⅞.

Often, however, a stock is affected much more by overall market trends than by specific company or industry news. Cray Research, Inc. fell 1¼ on the day it introduced four supercomputers but rose 1¼ to 119 on Wednesday when the Dow Jones Industrial Average gained almost 14 points.

CLINTON WILDER

Ingres for PCs allows data base access

BY DOUGLAS BARNEY
CW STAFF

ALAMEDA, Calif. — In a move aimed at broadening its distributed data base strategy and offloading applications development to less expensive systems, Relational Technology, Inc. this week will formally announce Ingres for personal computers. Ingres is a line of data base products, based on IBM's SQL, that run on Digital Equipment Corp. VAXs, IBM mainframes and Unix-based systems.

With Ingres for PCs, the firm now hopes to provide data base access and development across many major computer architectures.

The product has been extensively beta-tested with more than 1,000 copies already in the field. A typical implementation of the PC product will sell for $1,200 to $2,000 and will be available next month, according to the firm.

Gary Morgenthaler, chairman of Relational Technology, said the product is aimed at Fortune 1,000 accounts and volume applications developers. The main thrust of the product is stand-alone use, and it is geared for sophisticated data analysis and applications development, as opposed to transaction processing, Morgenthaler added.

Compatible with mini

"One of the major areas where it will be useful is for development. RTI has worked hard to keep it compatible with the minicomputer version," said Joel A. Saks, a programmer and analyst for the data base development group of the San Diego Center of Computer Sciences Corp.

According to Saks, the development of applications on personal computers that are ported back up to minicomputers will help the firm save money. Saks has been beta-testing Ingres for PCs.

Another beta tester agreed. "One of the areas I see Ingres for PCs as really having a use in is a developmental area. People can develop entire applications away from the host machine.

"When that application is finished, they can put it up onto the VAX," said Steve Almond, chief, data base adminstration for Agriculture Canada, an agency of the Canadian government similar to the Department of Agriculture. The product also works in a distributed fashion, accessing Ingres running on larger systems.

The core of this strategy is the Ingres/Star, an open architecture distributed data base enviroment, which allows for data to be shared between a variety of architectures and operating systems. "Ingres for PCs is a full participant in Ingres/Star through its asynchronous interface," said Ed Forman, product manager for RTI.

The firm said it believes it can sell some 500 copies of Ingres for PCs per month.

Senior Editor Charles Babcock contributed to this report.

Amdahl

FROM PAGE 1

dahl's E series provides a dimension of user friendliness that the rival IBM migration scheme lacks, according to Kimball Brown, an analyst with San Jose, Calif.-based Dataquest, Inc. Under the IBM method, users are prohibited from upgrading current 3090s to the corresponding E systems. Instead, customers are forced to graduate to the next highest model number.

Amdahl 5890 customers who want a modest increase in performance can upgrade to an equivalent E-series CPU without adding boxes. Larry Williams, operations manager at Southland Corp., the Dallas-based owner of the 7-Eleven convenience store chain, who manages an IBM 3090 Model 200 and an Amdahl 5890-300, said of the Amdahl arrangement, "If all you have to do to get 4% to 13% more performance is switch boards, your system will occupy less floor space, dissipate less heat and require less cooling than with an IBM enhancement."

Amdahl also bridged the performance gap between its 5890-300, which reportedly executes 41 million instructions per second (MIPS), and the 70-MIPS 5890-600. Previously, users of the 5890-300 lacked a clear upgrade path. The 5890-400E, rated at 58 MIPS, falls between the 5890-300E and 5890-600E, according to company sources.

In addition to plugging a hole in Amdahl's product line, the 5890-400E restores a competitive edge that suffered a blow with the arrival of IBM's 3090-300E. Previously, Amdahl boasted greater performance with the 5890-300 and less expense with the 5890-200 than IBM's 3090-200, according to Phoenix-based Annex Research, President Bob Djurdjevic.

But the three-CPU 3090-300E, which rivals the power of Amdahl's full-power dyadic offering, neutralized Amdahl's two-pronged strategy. Now, with a three-CPU system of its own, the firm's competitive position has been bolstered, Djurdjevic said.

Although a basic 5890-400E costs 15% more than its closest IBM equivalent, the Amdahl machine outperforms the 3090-300E by 24%, Amdahl claimed. The 5890-400E supports up to 512M bytes of main storage and 96 channels.

A basic configuration that includes 64 channels and 128M bytes of main memory, the 5890-400E costs $7.275 million. Field upgrades to E-series models cost $120,000.

Deliveries of the 5890-400E and 5890-600E are slated to begin during the fourth quarter, as opposed to a June starting date for the 5890-190E and 5890-300E. The first E-series machines to be available will be the 5890-200E, which begins shipments next month.

INSIDE LINES

Going down the line. Enhancements to the IBM RT PC and a low-end model of the IBM 9370 departmental system are expected among several products to be announced tomorrow. IBM also reportedly plans to speed up general delivery of several of the 9370 machines announced in October for delivery during the second half of this year. Analyst Richard Mikita of Framingham, Mass.-based market research firm International Data Corp. says the new 9370 is likely to be known as the 9370 Model 10. Marty Gruhn, vice-president of The Sierra Group, a Tempe, Ariz.-based market research firm, says she expects the 9370 technology to be moved to a desktop machine, although the upcoming low end may not be that small. She also speculates that IBM might announce office software for the 9370. However, Robert Simko, executive director of International Technology Group, a Palo Alto, Calif.-based market research firm, says tomorrow's announcement is likely to be a 32-bit bridge machine overlapping the low-end and high-end models of the 16-bit System/36 line.

Surfin' U.S.A. It goes by the name of Silver Surfer, and if one beta tester is right, it will become the dominant data base on Apple's Macintosh. Apple is bringing the product from France, sources said. One of the key advantages that Silver Surfer has over rivals is a sophisticated data base language that also has total control over Apple's Laserwriter. Printed data base reports can take advantage of the desktop publishing capabilities of the Macintosh and the laser printers.

Somebody didn't listen. In a report on the slew of 1986 espionage scandals, the U.S. House of Representatives' intelligence committee makes brief mention of the need for greater computer and communications security in government. The report says senior U.S. officials are careless about their use of car phones, which are easy targets for electronic eavesdropping, and they sometimes discuss sensitive matters over open and unsecure communications lines. "The final go-ahead request for Navy aircraft to force down the Egyptian airliner carrying the Achille Lauro terrorists was phoned in the open to Air Force One," the report said.

Who's on first? The first public sign of the NCR Tower 32/800 arrived recently when an NCR OEM customer, Reynolds and Reynolds, announced its ERA 9600 system for automobile dealers. That system reportedly is based on the 32/800, which is said to use multiple Motorola 68020 CPUs to achieve a processing speed of 2.4 million instructions per second. That makes the 32/800 slightly faster than the earlier high-end Tower 32/600. But the real gain is said to be in the number of users supported, as Reynolds and Reynolds claimed its 9600 supports 200 users, compared with the 48 users supported on 32/600-based systems.

A fifth columnist? Would-be high-tech union organizer Rand Wilson has gone over to the other side. Once a gadfly to Massachusetts' Route 128-belt companies, Wilson can now be considered one of them as a salesman for a local software firm. But by joining them, he may beat them yet. Wilson's software happens to be a system for automating unions. Despite his target market, Wilson is quick to point out that he has not given up on his earlier endeavors. In between sales calls, he's helping to organize a Communications Workers of America national press conference in which the labor group will air its complaints about health problems that have been associated with the semiconductor industry, Wilson says.

Last seen jilted at the altar. Bill Krause, president of 3Com — despite the disappointment of seeing his company's proposed merger partner Centram bed down instead with Sun Microsystems — has a few aces left up his sleeve. At a recent investor forum in New York, Krause said 3Com will release a version of Ethernet running at 10M bit/sec. over standard telephone wire sometime between the second quarter and year's end. Krause also confirmed 3Com's interest in the network station market, predicting that "one day, communications capabilities will come with the workstation."

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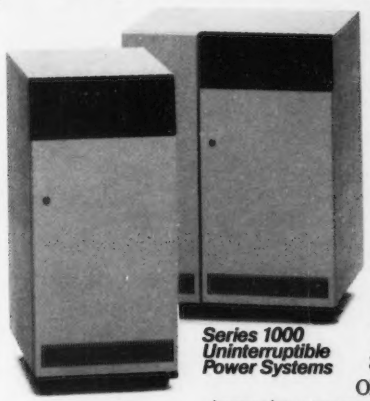

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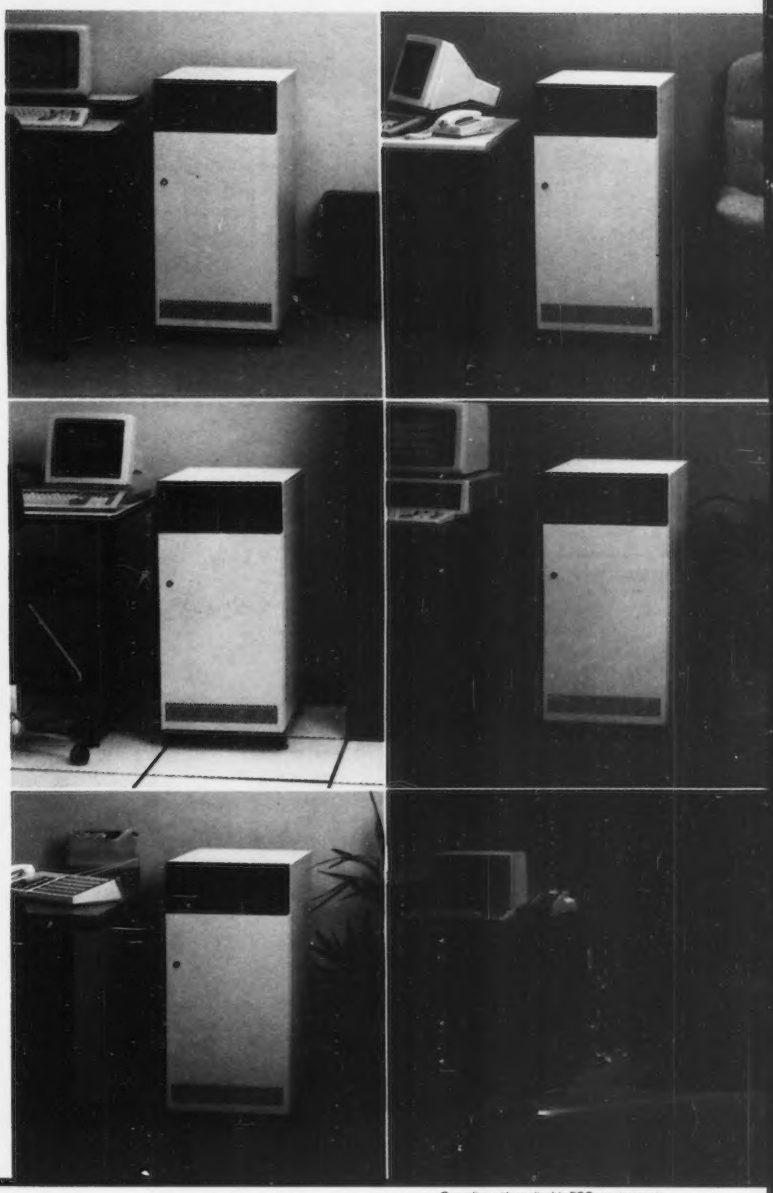

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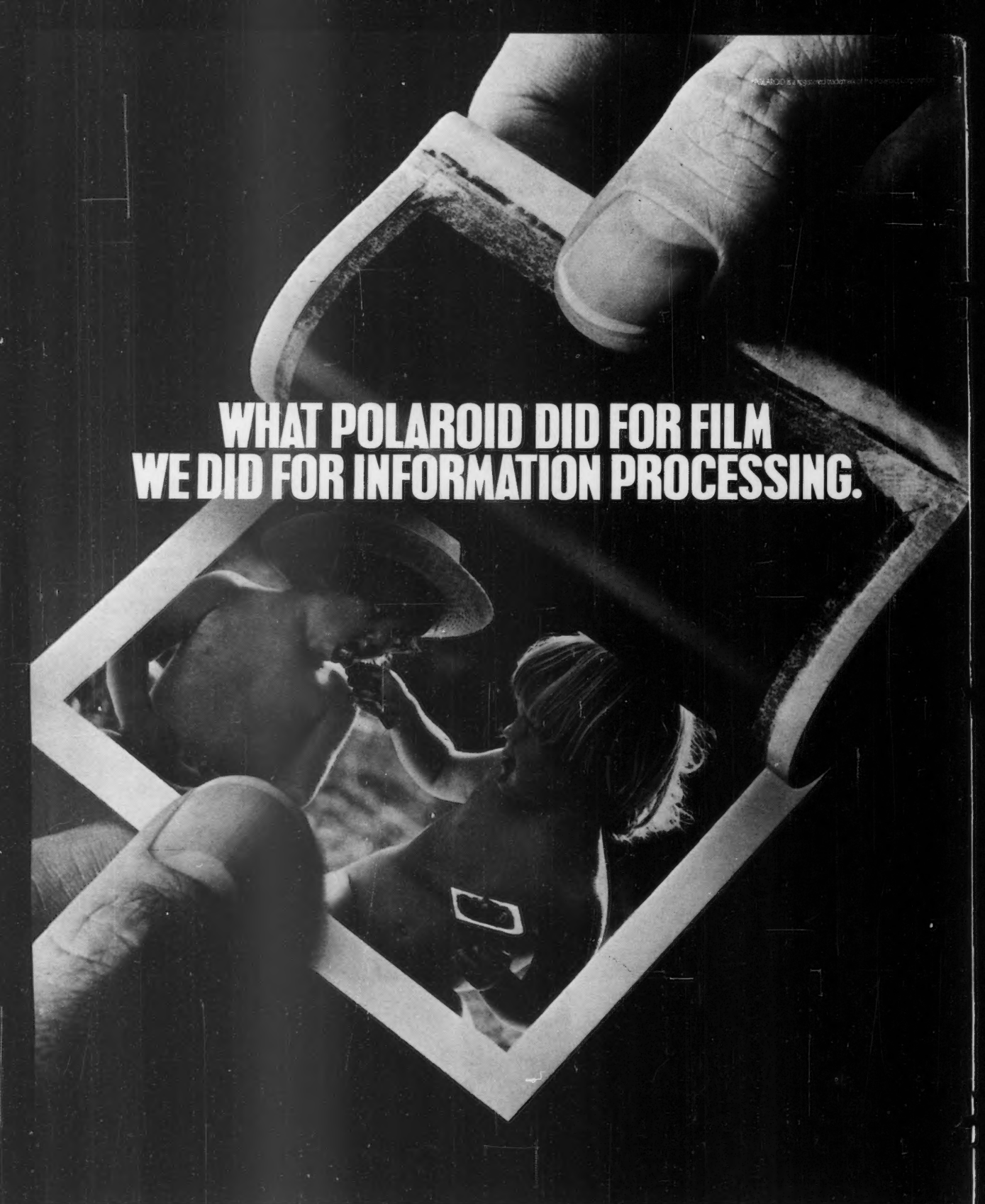

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